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Music & Computers

MAR/APR 1997

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[1] except RCA tape jacks, headphone jack & inserts.

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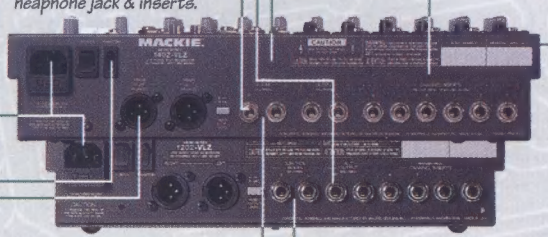

Control Room outputs feed monitor speakers without tying up the headphone jack.

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Solid **steel chassis** & thick **fiberglass internal circuit boards** resist abuse. These mixers are so sturdy we demo 'em at trade shows by STANDING on them!

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Our MicroSeries 1202-VLZ & 1402-VLZ might have small footprints, but they stomp when it comes to sound quality.

Since both are basically chips off our blockbuster 8•Bus Series consoles, they have big-board specs including more dynamic range than compact discs.

Why own an imitation when you can own the brand of compact mixer that serious pros prefer. Call for info today.

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READER SERVICE NO. 101

Music & Computers™
MARCH/APRIL 1997

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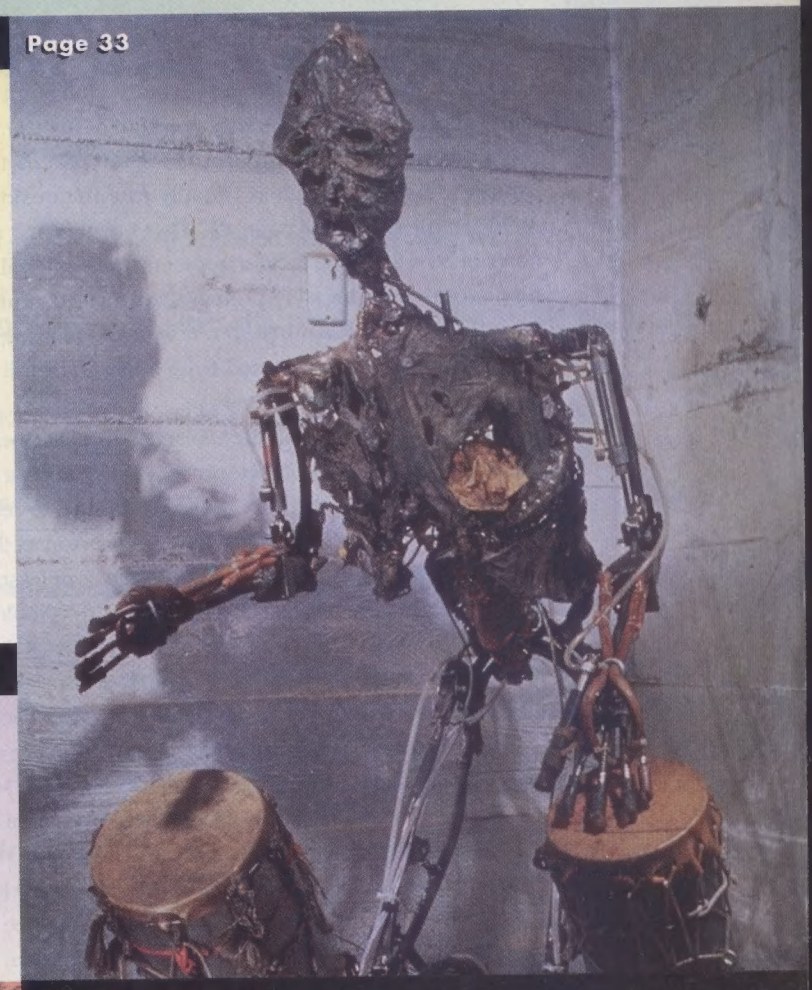

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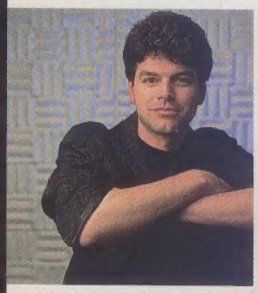
From the Editor



*Shhhhh*owtime!

A number of the themes we've been following in the last several issues reach their exciting conclusions this month. In September '96, we wrote about how off-the-shelf music software was being used to control 30-foot-tall robots. Today, we take you behind the scenes at the robots' recent European tour. (See page 33.)

Dave O'Neal's improbable four-part trilogy on making a CD at home climaxes with the actual creation of his CD. Dave stopped by the office the other day to drop off some photos for the story, and I burst into laughter when I finally saw the desktop where he had recorded his disc. (See page 42.) He's been saying all along that you don't need a $50,000 studio to record professional-quality music at home, but when he slyly pulled a real live CD out of his backpack and fired it up, I was a believer. It was astonishing to hear the massive guitar sounds he coaxed from a five-inch-tall battery-powered amp and a handful of shareware.

If you've been following the CD series from the beginning, you'll recall that it's about the *complete* process of recording a CD at home, from assembling the equipment to designing sounds, to recording, overdubbing, mixing, and processing the audio. So after reading the last installment, which is heaviest on the actual CD-R details, I confessed to Dave, "Hmm. I was expecting the final step to be a lot more complex."

"Well," he replied, "when I started this project, I didn't know how to record a CD, and now I have one. It really wasn't that hard." It struck me then that recording a CD at home may soon become as commonplace as recording a cassette. Want proof? An electronics store here in Silicon Valley just advertised a CD recorder for $339. More telling, OMI's new software (see page 15) lets you assemble a custom CD on your desktop by dragging songs from commercial CDs onto a window.

But perhaps the biggest surprise in this issue is our feature on Internet MIDI. It builds on our coverage of MIDI files (Nov/Dec '96) and realtime Internet audio (Jan/Feb '97), then takes a sharp turn into an explosive new area for desktop music — interactivity. Yes, MIDI, that perpetually underrated system for interfacing digital musical instruments, is forming the basis for some evocative new music technology.

And the site of greatest activity is the World Wide Web. Powerhouses from Microsoft to Headspace (Thomas Dolby's new company), are creating interactive music engines that will do more than shatter the silence on the Net: They may well provide the key component in a new type of immersive experience. Our cover shows some scenes from Offworld, an unreleased prototype of such an experience developed by Headspace.

Enjoy the issue — I'll be back in May to tell you about some exciting developments at *M&C*.

—David Battino

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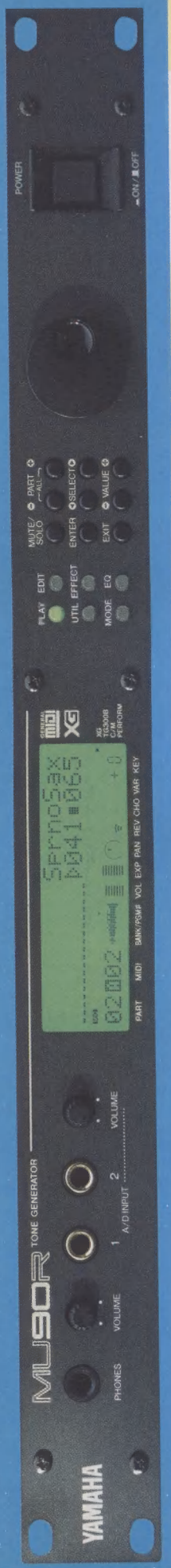

What do you look for in a tone generator? Lots of voices and lots of polyphony, right? Then

More *voices.*

you're going to love the new **Yamaha MU90R**. It's got an huge collection of 779 XG instrument voices and 30 drum kits plus 64-note polyphony and 32-part multi-timbral

More *effects.*

capacity. And it gives you **tons of effects** so your music can sound precisely the way you want it. What good are a lot of voices if they don't sound good? The MU90R

More *fun.*

voices were all sampled with proprietary Yamaha AWM2 technology and Yamaha expertise for **premium sound quality.** But don't take our word for it, check them out yourself. We know you're going to add effects to the voices so we've put loads of them in the MU90R–**179 effects in all.** With 12 reverbs, 14 choruses, 62 variation effects, two insertion effects with 43 algorithms each and 5 multi-type EQ effects, plus 2-band parametric EQ for each of your 32 parts, you can perfect your music entirely inside the MU90R with **no compromises.** But wait, there's MORE. There's enough instruments in the MU90R to cover any musical composition. But you'll probably want to add your own voice and an acoustic instrument. The MU90R has two inputs right on the front panel. **Plug yourself in** and then add the MU90R's effects just as if your inputs were internal MU90R voices. If you're looking for more in a tone generator, look no more; with nearly 1,000 voices and 179 effects, the **Yamaha MU90R delivers.**

More *to come.*

As if the MU90R didn't have enough, look for the Yamaha MU100R tone generator this summer. The MU100R offers all the MU90R features plus more waveROM, more voices and two expansion slots for more sound generating capability **than ever before.**

READER SERVICE NO. 102

GENERAL MIDI XG

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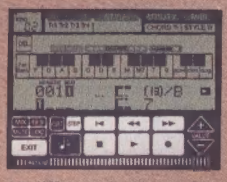
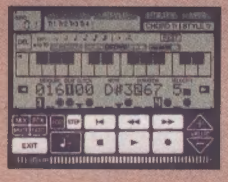
Realtime faders give you control of volume, panning, reverb and chorus levels for all 8 tracks.

Intro, fills, verse, chorus, ending—the Style Track lets you lay out your song visually.



27 different chord types to choose from in any key with any bass note—even a different chord on every beat.



With step editing you can go deep. Change the velocity and duration of one note, move it a few clock pulses ahead, or insert individual events.

When you're ready to get back to less comfortable surroundings, the PMA-5 has a built-in computer interface. And, because it's MIDI compatible you can play or record into the PMA-5 from a MIDI controller. You can even exchange Standard MIDI File data with your computer for freedom you never had before using the optional PC Communication Kit.

When traveling with a band won't work, the PMA-5 will. Since the PMA-5 is battery powered, you can have a band at your side anytime or anywhere. Choose from up to 20 songs, select bass and drum parts, transpose to any key at will, choose a preset style or create your own. It even has a built-in start/stop jack.

Try the PMA-5 at your nearest Roland dealer or call 1-800-386-7575 to receive a PMA-5 demo video for $5.00.

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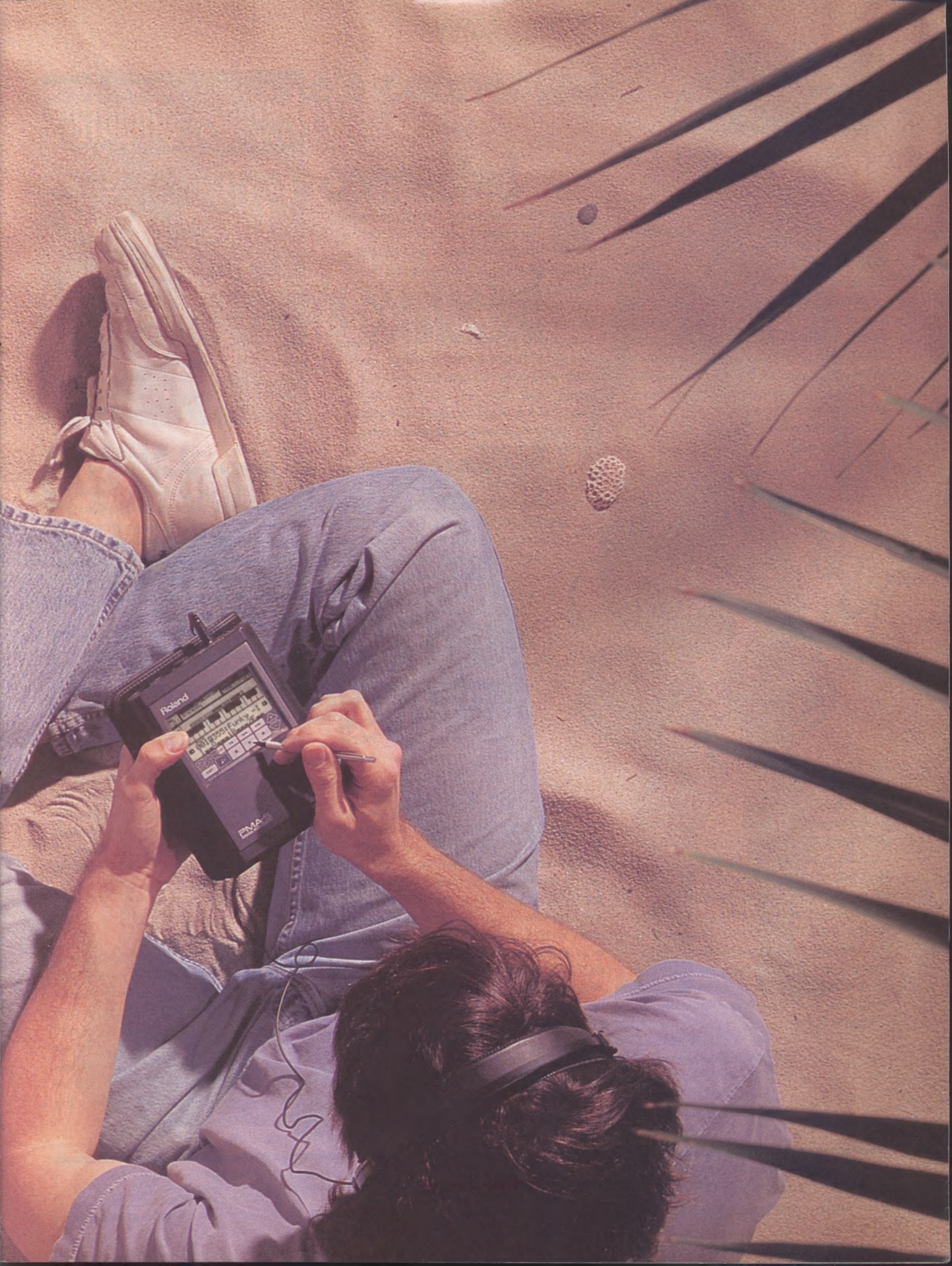
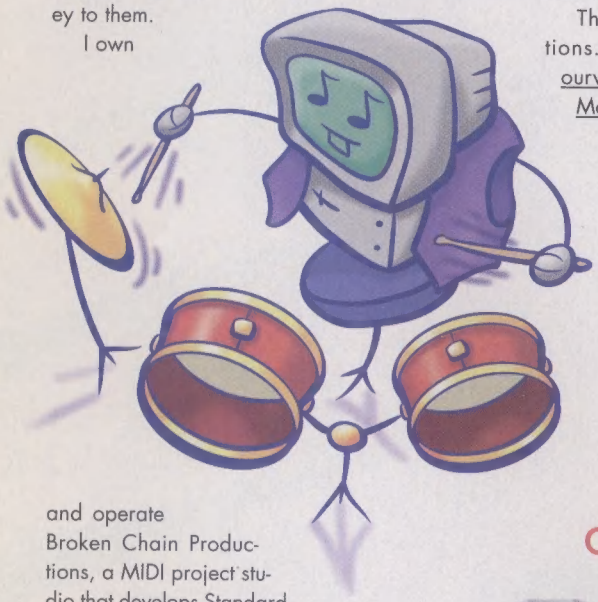

Roland

input

Expose Yourself for Money

Your Nov/Dec '96 issue is excellent. I found subject matter for the novice to the professional. I will be starting a subscription.

The sidebar on the MIDI license issue ["The Future of MIDI Files"] was very interesting, even though, in spite of the fact that the Copyright Office has made a decision, nothing seems to be settled. I have a hard time figuring what the problem is. The commercial companies that restrict the use of their music obviously can't see that more exposure means more money to them.



I own and operate Broken Chain Productions, a MIDI project studio that develops Standard MIDI Files of Christian music. I currently have an inventory of 260 files, 180 of which I have been licensed to sell by the copyright holder(s). My company is just over two years old and the going is tough, but it is worth it. I would be pleased if the next time you run a list of producers or distributors, you would include my company. I'm sure that there are a lot of people like me trying to get into this business. I would be glad to share with them.

Jim McCraw
Broken Chain Productions
5355 S. Santa Aurelia Ave.
Sierra Vista, AZ 85635
102426.1141@compuserve.com

Budda Bing!

I stumbled across a program called The Drums Professional on the Internet. It said it created MIDI drum loops, which is something I have needed for a while. After downloading and installing it, which was easy and fast, I loaded it up. It was set up in just a few seconds and ready to go.

Sure enough, you hit Play, then, by clicking on a grid while the loop is rolling, choose which percussive instruments you want to be played when. After you are done with your loops, you can export them to a MIDI file and then import them into your sequencer software. Quite nice for $30.

The company is MediaTech Innovations. They have a Web site at http://ourworld.compuserve.com/homepages/MediaTech_Innovations. They also make a program called Rhythm Brainz that adds many more features and allows you to add other instruments to your loops. I know there are other folks who are having trouble with percussion (and on a budget) who could use a product like this. Thanks for a great magazine!

Adrian Barnes
Knoxville, TN
adrian@icx.net
via Internet

Chewing the Fat

The Fat Man's column in the Nov/Dec '96 issue really hit home. I have been exorcising the hell out of my computer trying to get everything to work so I can get back to composing. All I wanted to do was upgrade from a 486 and pick up Windows 95 at the same time. I swear to you on a stack of owner's manuals that I started this deal in early September and I finally got my MIDI, digital audio, and everything else going the way God planned it on November 13th. I had to 86 my Turtle Beach card because it locked up the MIDI driver, which caused Vision for Windows to do its bad acid trip and my digital audio software to randomly "chipmunkize" tracks. In other words, I was ready to give all this stuff to someone I really hate!

10 WAYS TO USE A COMPUTER IN THE CLASSROOM
Music & Computers
THE MAGAZINE FOR DESKTOP MUSIC
MIDI Files
MUSIC YOU CAN PLAY WITH
PLUG-IN AUDIO SOFTWARE
MAKING A CD AT HOME
MIDI ORCHESTRATION SECRETS!
NEW MOD MUSIC COLUMN

Now that it works, I am more sedate and have done a lot of good work and am in the middle of editing a jingle. Sounds great, too, but please tell me you guys [at Project Bar-B-Q] at least had some good discussions about making everybody's stuff work with everybody else's. I read the column to my wife while we were eating tonight and she responded like a one-woman congregation: "I hear you, brother! . . . Aaaamen! . . . Talk to me, Fat Man!"

She very calmly waited day after day, night after night, while I labored away in my laboratory — er, my little studio — trying to get things going so I could get back in business. She finally told me tonight that if she had had the money she would have paid someone to fix my system.

But nobody else I know in town knows any more than I do about this particular stuff. I'm sure there is someone out there who can fathom these things, but I have yet to meet him/her.

John Holston
Austin, TX
via Internet

Let's be Franke

In my opinion, *Music & Computers* is one of the finest (if not the best) music magazines on the market today. The content is technical enough for most musicians, but also gets me excited when I read the feature interviews. The article on Christopher Franke in the Nov/Dec '96 edition is highly inspiring! The man is a creative genius. (You can tell by now that I am a big Tangerine Dream fan.) ►

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What does one have to do to submit an article to *M&C*? I am an aspiring young musician, developing my own home studio, and I would love to share what I have learned (to date) with your readers.

Mark "Doc" Dochtermann
Foster City, CA
via Internet

Mark — We're always open to freelance submissions. To save both of us time and effort, though, start by sending us an outline of the article you'd like to do (e-mail is fine). If we think your idea has potential, we can then work together to refine the outline.

We ask writers to take care to explain jargon and complex concepts. Computer music is a big field, and everyone is sketchy in some areas. Our aim is to be friendly and inspiring, yet detailed and precise. We strive to give all our articles, even the interviews, a "how to" orientation. (We often tell authors to imagine we've shown up at their door with a video camera to watch as they demonstrate a particular music or computer technique.)

If all this sounds daunting, don't worry. Quite a few of the articles in M&C have been written by first-time authors who made up in enthusiasm and musical expertise what they lacked in writing experience. You might also consider submitting your ideas as reader tips. We pay $25 for each original, previously unpublished tip we print.

Just Not the Shame

I've been reading your beautiful and useful magazine since it first came out. Although I've found tons of information inside, and appreciate your effort to explain very complicated things in very simple and clear terms, I sometimes find it hard to put it all together. My knowledge of computer music is very limited and circumstantial. I started dabbling with Cakewalk and a [Roland] Sound Canvas to make MIDI files for my salsa band (Los Latinos) here in Italy. From then on, I've been able to recreate several songs that we use. Nevertheless, when I take an in-depth look at all the potentialities that MIDI can offer, I cannot help feeling overwhelmed. Much of what I've learned has come from your hints, a few suggestions, and a lot of time spent tweaking.

I'd like to know if there is a step-by-step publication on how to use, let's say, sys-ex, or learn how to pan the drumkit, etc. My technical vocabulary is very small, and in two weeks' time I've visited several Web sites: Cakewalk, Synth Zone, and the like. But to be honest, I feel a little ashamed to ask questions like these to people who use MIDI in a much more advanced way. Maybe I should just forward my questions and see what happens, or is there a FASQ (Frequently Asked Stupid Questions) site on MIDI? I'd be very grateful if you could illuminate me on where to go.

Again, keep the wonderful job you're doing with the magazine.

Ismael Penedo
isma@fol.it
via Internet

Ismael — It sounds like you're farther along the learning curve than you realize. But at the risk of sounding cliché, there are really no stupid questions, only rude ones. If you ask them politely, most desktop music enthusiasts will be happy to help you along. (And if some bitter, know-it-all Net lurker does lash out at you, all you have to do is hit the Delete key.)

Our sister magazine Keyboard's *site, www.keyboardmag.com, offers an extensive glossary of music technology terms and a helpful collection of introductory articles, many written by Jim Aikin, who continues to explain MIDI in our Mysteries of MIDI column. Internet newsgroups such as alt.music.midi, comp.music.midi, and rec.music.makers.synth*

are also a good place to pick up tips. Browse the postings for a few days and you'll likely come across several FAQs, if not an answer. If not, then ask away.

It's a Jungle Out There

Your mag is the greatest. So how about monthly? Every musical genre seems to have its own production method. I'm interested in dance, house, hip-hop, and jungle. I'm sure that could fill you up monthly.

"EDUNCANSON"
via AOL

Ed — If we continue to grow as we have been, a monthly schedule won't be far off. Thanks for your support!

That Tapes the Cake

First of all, great magazine! I'm just a beginner but have learned tons from your articles. I have a 75MHz Pentium with 16Mb of RAM and a Gravis UltraSound, and I'm currently using [Howling Dog Systems] Power Chords software for writing music. I was wondering if it is possible to get a MIDI-compatible 4-track machine and download the pre-mixed music from my PC to track 1 so I could have tracks 2–4 for vocals. The software I found to use for vocals and MIDI is Cakewalk Pro Audio but it's kinda pricey. If there are any hints on MIDI converters or software you can give me, it'd be great. Keep up the great work!

Jason Little
Toronto, Canada
via Internet

Jason — Any 4-track cassette recorder will let you record the audio output of your soundcard on track 1 and overdub vocals on tracks 2-4. Integrated MIDI sequencer/hard-disk recording software will let you do it all on the computer with better sound quality, and this software has dropped in price dramatically recently. For example, the entire Cakewalk line, down to

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Join our World of Sound and Vision!

Sound System MAESTRO 32/96

TerraTec's high-end soundcard, honoured with more than 15 awards in PC magazines, has been improved with the latest technology and extended with a lot of new functions. The well established 4 MB GM/GS wavetable has been integrated onto the soundcard, a second MPU-401 interface was added and an additional Waveblaster™ compatible connector now allows the simultaneous utilization of two synthezisers on up to 32 MIDI channels (with an optional TerraTec Wave System or external MIDI equipment). Of course this solid music machine provides the greatest comfort in installation and handling with Plug and Play and complete software setup of all functions. An extended input circuit supports 2 external Line-In's an one Microphone-In. The extremely noiseless design enables simultaneous record and playback up to 48 kHz with 16 Bit stereo in professional quality. Hereby the ATAPI-IDE interface supports the high-speed data transfer of the latest CD-ROM drive. If a PC based HIFI center, a professional musician's tool or a Multimedia sound machine is wanted, the Maestro 32/96 is a must for the enthusiastic user!

Technical specifications:

Compatible to:
- Roland Sound Canvas SC-55 MK II (soundcompatible)
- Roland SCC1 / RAP-10 / SCD-15 (soundcompatible)
- General MIDI
- Roland MT32 (via PatchMapping)
- General Synthesizer Standard (GS)
- Roland MPU-401 (UART mode)
- Soundblaster™
- Soundblaster™ Pro
- Adlib™
- MPC level II
- Microsoft Sound System™ 2.0

Wavetable:
- 32 MBit (4MB) Rom
- GM/GS Wavetable with 32 voices and Multieffectprocessor
- 393 Sounds, 8 Drumkits (incl. 1 SFX-Kit)
- 8 Reverb- and 8 Chorus-types
- Soundcompatible to Roland Sound Canvas SC-55 MK II / SCC-1, General MIDI, General Synthesizer Standard (GS).
- Latest DCC DAC technology
- Roland MT 32 (via PatchMapping

Audio features:
- 8/16-Bit audio Stereo/Mono for record and playback up to 48 kHz samplefrequency
- High-quality CODEC with simultaneous Full Duplex record and playback
- 4 bit hardware compression ADPCM
- 16 bit Hardware realtime compression and expansion with m-Law, A-Law CCITT Standard
- Record and playback from all audio sources

FM-Synthesizer
- 40P+ technology
- 20 voices, Stereo

Stereo Digital / Analog Mixer:
- Mix of several audio sources: CD, Synthesizer, Stereo DAC and 2 line-In.

Midi Interface:
- 2 Roland MPU-401 MIDI interfaces (UART mode)
- Standard Soundblaster™ MIDI interface
- 64-Byte FIFO
- Duplex MIDI interface for simultaneous record and playback on up to 32 MIDI-channels

Game Port for two joysticks

CD-ROM interface for:
- Enhanced-IDE ROM drives

Waveblaster comp.connector:
- Compatible to all TerraTec Wavesystems
- Compatible to the most common wavetable upgrades from other manufacturers

Amplifier:
- Stereo amplifier with 4 Watts per channel

Contents: Soundcard, Audio cable, Microphone, MIDI Kit, Hardware manual, MIDI- and Wavetable-manual, Installation disks, Register form.

Bundlesoftware:
- Steinberg 'Cubasis Audio Light',upgradeble - 32 MIDI-tracks, score-editing and 2 stereo digital audio tracks
- Various 16/32 Bit Utilities

TERRATEC PROMEDIA

TerraTec USA
27132-B Paseo Espada, Suite 1205
San Juan Capistrano, CA 92675

Tel. (714) 249-4333 Fax: (714) 846-5821
E-mail: TerraTec@Pacbell.net
READER SERVICE NO. 106

the $69 Cakewalk Song Station, now offers digital audio recording. You might also want to check out Voyetra's Digital Orchestrator Plus ($160), Midisoft Studio ($199), and Hohner Midia's Q-Tracks Pro ($169).

For best results when recording vocals into your computer, avoid your soundcard's mic input, which is likely to be noisy. Instead, get an external mic preamp ($75 and up) and plug its output into your soundcard's line input.

Spare the MOD

As part of my degree (BSc Information Studies), I have to do a module about Hypertext. For this module, I have to construct a Web site. Here is where you come in. I was wondering if you would mind if I took the content of Eric Bell's article, "The MOD Revolution" and turned it into a Web site.

The site would show clearly that the article was written by yourselves and not me, as this is not part of the marking criteria. Many thanks in advance for your consideration.

Mikey
via Internet

Mikey — Thanks for your interest. Unfortunately for your plan, it is illegal for anyone other than the copyright holder to reproduce copyrighted material — such as a magazine article — on a Web site. Feel free to add a link to our site, www.music-and-computers.com, though.

Just wanted to thank you and Eric Bell for such a positive review of Chill Productions ["MOD Philes," Nov/Dec '96]. I think I speak for most of the MOD scene when I say it's a very unrewarding hobby in general. We pour our hearts and souls into the music we write, and give it out for free. The only thing that keeps us going is the occasional e-mail complimenting us on our toons. And now we have Eric's column! It's long overdue that this scene and its musicians received the recognition that they deserve.

By the way, Chill Productions has moved to its permanent address at www.bentdesign.com/chill.

John Taite
aka DeusEx/Chill Productions
via Internet

We Have a Winner!

I was just wondering who ever won that Opcode/Apple giveaway [July/Aug '96]. If you know, could you tell me?

Chris B.
via Internet

Chris — The lucky readers were Robert Scharlau of Illinois and George Tandy of Florida (pictured). Robert tells us he started playing guitar at age seven, then drums and keyboards. He was a computer programmer for a while and now makes money creating computer music. George is a keyboard player who has produced his own CD, Urban Jazz, for Eltan records. Each received almost $7,000 worth of desktop music gear, including Opcode Overture and Vision (notation and sequencing software), an Apple 7200 Power Macintosh and 600dpi laser printer, a Roland XP-10 synthesizer, and a Mackie 1202-VLZ mixer. Stay tuned for future giveaways — we're working to get one in every issue.

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Keyboard:
QS6/QS7: 76-zone, 61/76 semi-weighted keys. QS8: 76-zone, 88 fully-weighted piano-action keys. All: velocity, release velocity and aftertouch.

Programs:
640 Programs and 500 Mixes internal, expandable to 1664 Programs and 1300 Mixes. Includes GM compatible bank.

Sample ROM:
16 bit linear 48kHz samples. QS6: 8MB internal, expandable to 16MB. QS7/QS8: 16MB internal (includes enhanced Stereo Grand Piano and Keith Emerson organs and modular synthesizer waves), expandable to 32MB.

PCMCIA Expansion:
QS6: 1 8MB card slot. QS7/QS8: 2 8MB slots. QCard and Sound Bridge compatible. 8MB QCards include Hip Hop, EuroDance, Vintage Keyboards, Sanctuary, Classical, and more. Sound Bridge imports new samples and plays back SMF sequences from a card.

Synthesis Engine:
64 voice polyphonic, 64 part multitimbral, Tracking Generator, Modulation Matrix.

Controllers:
QS6: Pitch and Mod wheels, 4 assignable control slider, sustain pedal and assignable pedal inputs. QS7/QS8: Pitch and Mod wheels, 8 assignable control sliders, sustain pedal and 8 assignable pedal inputs.

Effects:
Alesis 4-bus multieffects with reverb, chorus, flange, delay, overdrive, EQ, rotary speaker emulation and more.

Interfaces:
QS6: Audio, MIDI, high speed Serial Port for direct connection to Mac® or Windows® computers. QS7/QS8: Above plus ADAT® Optical Digital output.

QS Series CD-ROM:
CD-ROM includes free software for sequencing, editing and much more. Includes Steinberg Cubasis™, Mark of the Unicorn Unisyn™ for the QS Series, Opcode Galaxy™ module, 3000 extra Programs and Mixes, software demos and MIDI files.

® Alesis and ADAT are registered trademarks. QS6, QS7, QS8, QCard and Sound Bridge are trademarks of Alesis Corporation. All other trademarks are property of their respective holders. For more information on the Alesis QS Series, see your Alesis Dealer or call 800-5-ALESIS.

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Audiowerk8, Emagic's new PCI based digital audio recording card, makes hard disk recording as easy as tape. With 8 discrete outputs, stereo analog ins and digital I/O, solutions are solutions without exceptions. Shipping with VMR, the "Virtual Multitrack Recorder", software so transparent, the manual is included in this ad. And for your growing studio needs, Audiowerk8 is fully compatible with the Logic Audio production system. The choice is simple, with a list price of $ 799.– creative expression with professional results is now affordable to all.

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1. Tracks

Play back eight tracks while recording two additional tracks. You can name each track and access a virtually unlimited number of alternative takes.

2. High Definition Level Meters

Allows you to accurately monitor the levels of your recordings on each track.

3. Left and Right Locator Displays

Shows you the currently selected in/out points. Values can be easily edited with click/drag mouse operation. Values can be readily selected and dragged into any of the 20 positions in the Position Memory bank and vice versa.

4. Cycle Button

Enables cycle playback and record between the left and right locators.

5. Track Switches

Besides the standard switches such as Solo, Mute and Record, the Stereo Buttons allow you to group 2 tracks together as one track for easy handling.

6. Wave Display

The positive waveforms of your recorded tracks smoothly scroll from right to left during playback and recording. This allows you to easily navigate through your recordings.

7. Set-Locator Button

These buttons allow you to write the current "tape" position into the locator displays on the fly. Controllable either with the mouse or with a keystroke, these buttons allow you to quickly generate new left and right locators.

8. Tape Indicator

Indicates how much space or "tape length" you have left for your recording. It also indicates your current position within the recording.

9. Auto Drop Button

With this button enabled, the VMR will automatically switch to record mode using the currently displayed left locator as record IN and the right locator as record OUT.

10. Tape Button

You'll need to choose a "tape" before making your first recording. Pressing this button gives you a variety of tape length options depending on the size of your hard drive.

11. Copy Button

This button allows you to copy, move or mixdown the data of "soloed" source tracks between the left and right locators to the tape position on a record enabled destination track.

12. Input Selector

Press "A" to choose the Analog Input, or "D" to choose the Digital Input on your Audiowerk8 Card.

13. Pitch Variation

Clicking on this button opens a display where you can simply enter the desired pitch value by clicking and dragging. Pitch ranges are from -9.99% to +9.99% in steps of 0.01%.

14. Position Memory Bank

Up to 24 positions can be stored with each tape. 4 can be displayed simultaneously. To view others, simply click on the slider and drag left or right. Clicking on the "pair" button between position memories gives you a "pair selection" which can be dragged into both locator displays simultaneously. Position memories can also be set and recalled via keystrokes.

15. Position Display

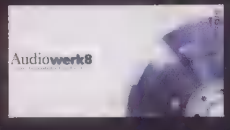
Optimized for legibility, the position display shows you the current tape position. A maximum tape length of 1 hour, 59 minutes and 59.59 seconds can be displayed.

16. Tape Controls

As simple to use as the controls of any conventional multitrack tape recorder.

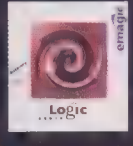
VMR "Virtual Multitrack Recorder" Software, included with Audiowerk8, Emagic's new 8 Channel Digital Audio Recording PCI Card.

AW8 plus VM Software



This turnkey solution is your easy introduction to Digital Multitrack Audio Recording.

AW8 plus Logic Audio Discovery



Along with advanced Audio Recording, Realtime DSP and Editing you also get an integrated Sequencing and Scoring solution.

AW8 plus Logic Audio

The Ultimate Music Production System including Realtime DSP, Sample Editing, Virtual Mixing, professional Scoring and more...

Easy entry – Easy upgrade:

The Audiowerk8 is an integral part of the Logic Audio System. You can add complete MIDI Sequencing, Scoring and Professional Audio Editing Features including Realtime DSP.

The Audiowerk8 will be available in early March at leading music retailers. The suggested retail price is **$799.–** including the Virtual Multitrack Recorder Software. For more information about Audiowerk8, system requirements and all available upgrade options please visit our webpage or give us a call.

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READER SERVICE NO. 140

Cutting Edge

by Debbie Greenberg & Jim Aikin

PC

Looking for a PC built specifically for music and audio? **Wave Distribution** is offering their **Pre-Configured Rack-Mount Solutions** (price varies depending on configuration). The computer is available with most popular sequencing and hard disk recording software packages pre-installed. Rack-Mount Solutions also offers hardware/audio cards, including Creative Labs Sound Blaster AWE32, Digital Audio Labs CardD and V8, Digidesign Audiomedia III, and hardware from Spectral, Merging Technologies, Metalithic, and Creamware.

All the vital components — software, drivers, soundcard, MIDI, and audio — are set up and ready to go. Choices for a typical system include 3- or 4-space rack-mount chassis, Intel 133, 166, or 200MHz Pentium processor, 16 to 128Mb high-speed EDO RAM, 1.2 to 3.5Gb EIDE internal hard drive, 8-, 10-, or 12-speed internal CD-ROM drive, and Windows 3.11, 95, or NT 4.0. Internal Iomega Zip or Jaz drives and front-panel finishes from tweed to snakeskin are also available. **Contact:** Wave Distribution, Rack Mount Solutions Division, 50 Bordeaux Terrace, West Milford, NJ 07480; 201-728-2425; fax: 201-728-2931; e-mail: nextwave@haven.ios.com; Web: haven.ios.com/~nextwave. ***Circle #145 on reader service card.***

PC

Talk about a music box: The **Midisoft Family Music Center** ($299.95) includes a four-octave MIDI keyboard with pitch-bend and modulation wheels, Midisoft Play Piano 2.0, Midisoft Studio 4.0, and a demo video — all to help you begin making music on your PC. Play Piano 2.0 contains over 400 lessons; it customizes and tracks lessons for each family member. On-screen video demonstrates proper hand positioning and fingering. With the Studio 4.0 MIDI sequencer, you can add instrumental sounds, vocal tracks, and special effects to the MIDI files you record. Requirements include a 486/33 or greater PC, Windows 95 or 3.1, 8Mb RAM, 21Mb hard disk space, a Windows-supported soundcard, and a double-speed CD-ROM.

If you want to print out your own sheet music, but you're shaky with notation, Midisoft's **Desktop Sheet Music** software ($99) can help. It responds to mouse input by dropping music symbols onto the most appropriate spots in a score, interprets your MIDI performance input to include staccato and legato marks where appropriate, and even plays back expression symbols such as crescendos and diminuendos so you can audition the results without stopping playback. The program comes with a library of over 100 songs, and can read Standard MIDI Files. Requires a 486 or better, Windows 95 or Windows NT 4.0. **Contact:** Midisoft, P.O. Box 1000, Bellevue, WA 98009; 206-391-3610; fax: 206-391-3422; Web: www.midisoft.com. ***Circle #146 on reader service card.***

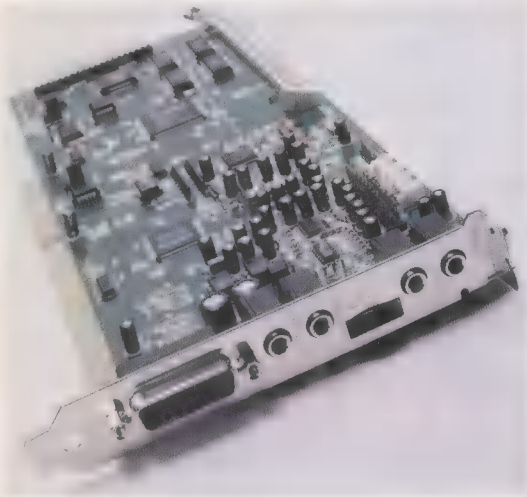
PC

So you've been trying to learn guitar, but books and charts just aren't cutting it. What if you could see the notes light up under your fingertips? Or input chords or scales with your mouse, creating a song you could then play back at any tempo with the chords appearing on the guitar neck? Those are some of the possibilities offered by Optek's SmartLight Interactive System for Guitar, an electronic learning system that connects to any PC with Windows 3.1, NT, or 95, or any Mac running System 6.x and up.

The SmartLight system includes a solid-body electric guitar (starting at $499.95) and the SmartLight software and PC connection kit ($349.95; Mac version due by the time you read this). A microprocessor controls the 132 LEDs embedded in the guitar's neck. The system can also import Standard MIDI Files. Contact: Optek Music Systems, Inc., P.O. Box 90485, Raleigh, NC 27675; 800-833-8306 or 919-878-7997; fax: 919-954-8389; Web: www.optekmusic.com. *Circle #147 on reader service card.*

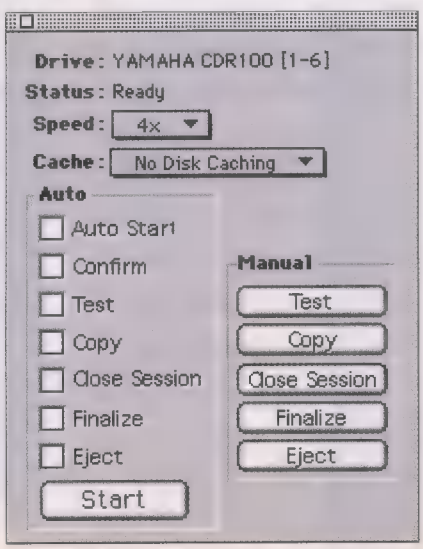
PC SOUNDCARDS

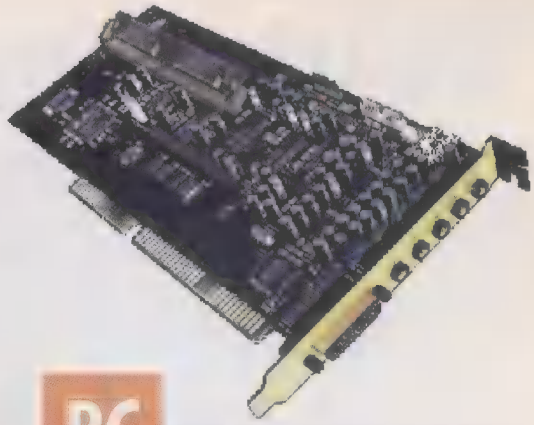
Tired of hearing note dropouts in those busy MIDI arrangements? 64-note polyphony is only one of the hot features of the new Maxisound 64 soundcard line from Guillemot International and Ubi Soft. The Home Theater 64 ($199) and Home Studio 64 ($299) soundcards deliver quadraphonic sound with four speaker outputs and realtime positioning and processing effects. The cards are full-duplex, plug-and-play for Windows 95, and feature Maxi Font Editor (a soundbank editing program that helps you create or download your own MIDI instruments) and a 4Mb ROM wavetable. Cakewalk Express, a MIDI sequencer, is also included.



Maxisound Home Studio 64 features digital audio I/O and Quartz Audio Master SE, a MIDI sequencer with eight .WAV audio tracks (with separate effects on each track) and SMPTE synchronization capabilities. Contact: Ubi Soft Entertainment, 625 Third St., 3rd Floor, San Francisco, CA 94107; 415-547-4000; fax: 415-547-4001; Web: www.ubisoft.com. *Circle #148 on reader service card.*

The recording industry's worst nightmare (and music lovers' fondest dream) is finally coming true with the release of **Optical Media International's Audiotracer 1.0** audio CD recording software ($99). It enables you to create custom CDs by copying tracks from audio CDs in a CD-ROM drive *directly* to a recordable CD in a CD recorder. (You don't need to transfer the audio to a hard drive first.) The software works with any CD audio source — standard audio compact discs, mixed-mode CD-ROMs, or enhanced CDs — and supports most CD-ROM drives and CD recorders. **Contact:** Optical Media International, 51 E. Campbell Ave., Ste. 170, Campbell, CA 95008; 800-347-2664 or 408-376-3511; fax: 408-376-3519; Web: www.microtest.com/html/optical_media.html. ***Circle #149 on reader service card.***





Fresh from Germany come two new **TerraTec** soundcards. The **Sound System Maestro 32/96** ($299) features a 4Mb GM/GS wavetable synth with 32-note polyphony and a multi-effect processor. A dual MPU-401-compatible MIDI interface and an additional Wave Blaster-compatible connector allow you to play two synthesizers on up to 32 MIDI channels simultaneously (using an optional TerraTec Wave System or external MIDI equipment). The card offers 393 sounds and eight drum kits, eight reverb and chorus types, and simultaneous record and playback of digital audio at a sampling rate of up to 48kHz.

TerraTec's high-end **AudioSystem EWS 64** ($590) offers two stereo outputs with 18-bit digital-to-analog audio converters (DACs), digital audio input in the stereo S/PDIF format, two digital outputs (also S/PDIF), and two MPU-401-compatible MIDI interfaces. The card boasts a wavetable synthesizer with up to 64-note polyphony and 318 sounds, 1Mb wavetable ROM, 1Mb sample RAM (upgradable to 64Mb with standard PS/2 SIMMs), an effect processor with reverb, chorus, and equalizer, 3D sound, and a sound editor. All TerraTec's soundcards are full duplex and plug-and-play compatible. **Contact:** TerraTec USA, 24040 Camino del Avion, Ste. A 297, Monarch Beach, CA 92629; 714-249-4333, fax: 714-846-5821; e-mail: TerraTec@pacbell.net; Web: www.terratec.de. ***Circle #150 on reader service card.***

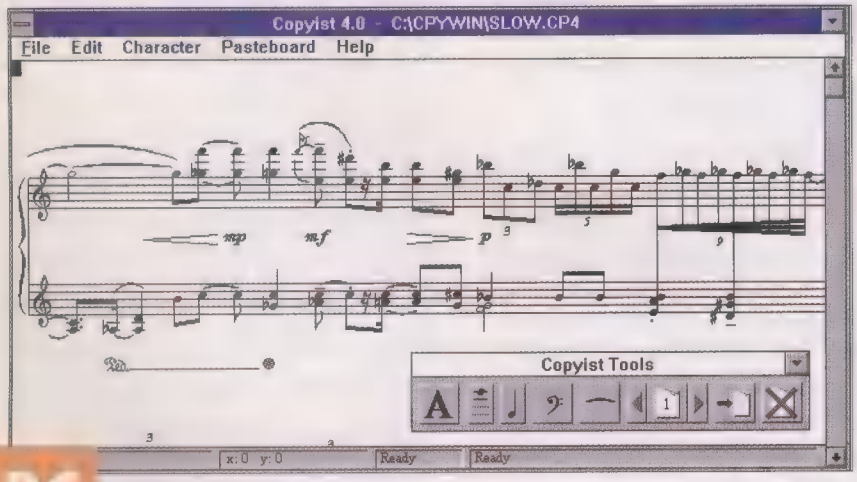
PLUG-IN PARADE

by Mikail Graham

[Ed. Note: Just after Mikail Graham completed his massive roundup of digital audio plug-in software for our Nov/Dec '96 issue, a whole new crop of plug-ins came out. We asked him to highlight some of the most intriguing ones here. Company contact information is on page 17.]

Steinberg just released **version 1.5** of their powerful **WaveLab** audio editor for Windows 95 and NT 4.0 ($399; upgrade, $99). It features true 24-bit audio support, stereo editing, batch processing (a function that can automate many tasks for you, such as adding a particular EQ to several files with just one command), a 3D spectrum analyzer, Microsoft ActiveMovie plug-in format support, Digidesign Session 8 PC support, and an audio database for organizing an entire collection of audio files on your hard drive, CD-ROM, or removable media. WaveLab 1.5 comes bundled with eight plug-ins: Parametric EQ, ToolsOne (providing channel swap, phase inversion, and more), Stereo Delay, Reverb, Resampler, Leveler, Auto-Panner, and Stereo Chorus.

New optional plug-ins for WaveLab 1.5 include **DeNoiser**; **DeClicker** (already available in TDM format); **Loudness Maximizer**, which Steinberg says creates "dynamically optimized material that consistently drives the audio up to 0dB without losing any punch or producing distortion"; **Spectralizer** (also available in TDM format), which is designed to make an audio file crisper, clearer, and in some cases even warmer; and **Externalizer**, which "simulates a precisely defined set of speakers" for helping you create a perfect environment for mixing. These plug-ins retail for $399 each and are Windows 95 compatible.



For desktop publishing that includes sheet music, consider **Sion Software**'s **Copyist 4.0** for Windows ($69.95; QuickScore Elite with Copyist 4.0 bundle, $119.95). Among its other publishing capabilities, this music notation tool lets you create musical examples. Notes, staves, clefs, and other musical characters are treated as graphical elements, so you can create small excerpts to be included in work that is predominately text, as well as complex scores. You can save your scores as .BMP, TIFF, or EPS files. Copyist works with Sion Software's QuickScore Elite music composition program — create a score in QuickScore and export it to Copyist for further processing and fine-tuning. **Contact:** Sion Software, 4497 W. Sixth Ave., Vancouver, B.C. V6R 1V2, Canada; 604-222-2454; fax: 604-222-4708; e-mail: sionsoft@infoserve.net; Web: www.infoserve.net/quickscore. ***Circle #151 on reader service card.***

Steinberg's **Grungelizer** ($199; see screenshot) offers some very bizarre effects, such as *adding* pops and clicks, record surface noise, and even the distorted sound of the needle as it gets duller. AC hum is available in two flavors: 60Hz North American and 50Hz Euro-hum. You can also journey back to the turn of the century via the Timeline knob, which is essentially a notch filter combined with a speaker emulator. Based on my first tests with the Grungelizer, I'm sure it will be the start of a whole new wave of low-fi controversy. Steinberg plans to make the Grungelizer available in AudioSuite, TDM, and VST formats, and is bundling it free with WaveLab 1.5.

Free Info!

Fast!

Free Product Information from *Music & Computers* magazine. Send in the card next to the Advertising Index.

Digidesign's LoFi/SciFi/RectiFi ($395) provides Grungelizer-like features, such as down-processing for making a 16-bit audio file sound like low-fi 2-bit audio. Add analog synthesizer effects via the SciFi mode and you have the perfect plug-in for the techno, hip-hop, rap, and ambient/industrial music scenes. LoFi/SciFi/RectiFi is available for the TDM plug-in format (and soon for AudioSuite).

Plug-In Manufacturer Contact Information

AnTares Systems, P.O. Box 697, Applegate, CA 95703; 800-446-2356 or 916-878-6666; fax: 916-878-8577. ***Circle #152 on reader service card.***

Arboretum Systems, 915 Cole St., Ste. 387, San Francisco, CA 94117; 415-626-4440; fax: 415-626-4439; e-mail: info@arboretum.com; Web: www.arboretum.com. ***Circle #153 on reader service card.***

Digidesign, 3401-A Hillview Ave., Palo Alto, CA 94304; 415-842-7900; fax: 415-856-4275; e-mail: prodinfo@digidesign.com or techsupt@digidesign.com; Web: www.digidesign.com. ***Circle #154 on reader service card.***

Emagic, 13348 Grass Valley Ave., Bldg. C, Ste. 100, Grass Valley, CA 95945; 916-477-1051; fax: 916-477-1052; e-mail: emagic@emagicusa.com; Web: www.emagicusa.com. ***Circle #155 on reader service card.***

Mark of the Unicorn, 1280 Mass Ave., Cambridge, MA 02138; 617-576-2760; fax: 617-576-3609; e-mail: info@motu.com; Web: www.motu.com. ***Circle #156 on reader service card.***

Opcode Systems, 3950 Fabian Way, Ste. 100, Palo Alto, CA 94303; 415-856-3333; fax: 415-856-3332; e-mail: info@opcode.com; Web: www.opcode.com. ***Circle #157 on reader service card.***

Steinberg North America, 9312 Deering Ave., Chatsworth, CA 91311; 818-993-4091; fax: 818-701-7452; Web: www.steinberg-us.com. ***Circle #158 on reader service card.***

Wave Mechanics, c/o Wave Distribution, 50 Bordeaux Terrace, West Milford, NJ 07480; 201-728-2425; fax: 201-728-2931; e-mail: nextwave@haven.ios.com; Web: haven.ios.com/~nextwave/. ***Circle #159 on reader service card.***

Waves, 6716 Central Ave., Ste. 8, Knoxville, TN 37912; 423-689-5395; fax: 423-688-4260; e-mail: waves@waves.com; Web: www.waves.com. ***Circle #160 on reader service card.***

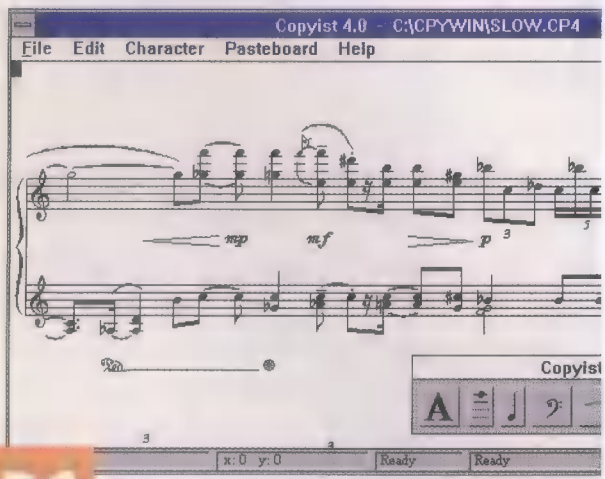
Cutting Edge

PLUG-IN PARADE

[Ed. Note: Just after Mikail Graham completed his n roundup of digital audio plug-in software for our Nov/ issue, a whole new crop of plug-ins came out. We asked highlight some of the most intriguing ones here. Co contact information is on page 17.]

PC

Steinberg just released **version 1.5** of their pc **WaveLab** audio editor for Windows 95 and ($399; upgrade, $99). It features true 24-bit audio su stereo editing, batch processing (a function that car mate many tasks for you, such as adding a particula several files with just one command), a 3D spectrum an Microsoft ActiveMovie plug-in format support, Digidesi sion 8 PC support, and an audio database for organiz entire collection of audio files on your hard drive, CD



PC

For desktop publishing that includes sheet mu **ware**'s **Copyist 4.0** for Windows ($69.95; Quick 4.0 bundle, $119.95). Among its other publishing capabilit tool lets you create musical examples. Notes, staves, clefs, a acters are treated as graphical elements, so you can crea included in work that is predominately text, as well as co save your scores as .BMP, TIFF, or EPS files. Copyist work QuickScore Elite music composition program — create a s export it to Copyist for further processing and fine-tuni ware, 4497 W. Sixth Ave., Vancouver, B.C. V6R 1V2, C fax: 604-222-4708; e-mail: sionsoft@infoserv infoserve.net/quickscore. ***Circle #151 on reader service c***

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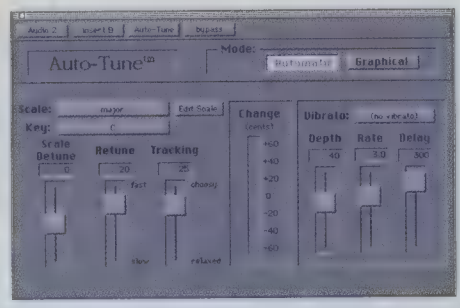
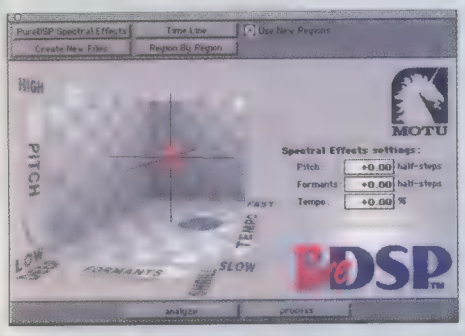
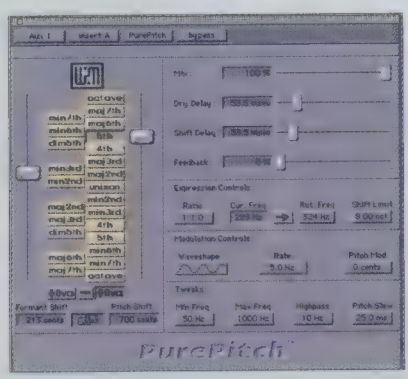


Pitch-shifting plug-ins are making some big strides. **AnTares**, makers of MDT, JVP, and SST, has introduced **Auto-Tune** (see screenshot). More than just a pitch-shifter, it can detect the actual pitch of the incoming signal (currently monophonic only) and automatically correct it to the closest pitch in the chosen scale. Auto-Tune is currently available for TDM and includes 22 microtonal scales for the exotic pitch tweakers among us.

Other new pitch-processing plug-ins offer "gender bending," a process that makes a male voice sound more female and *vice versa*. These plug-ins also let you change pitch without changing the timing of a musical passage and without adding that funny Munchkin-like quality to the sound. The first of these is **PureDSP** (see screenshot) from **Mark of the Unicorn** (MOTU). Until recently, it was only available in their Digital Performer 1.7 sequencer software, but now it works in the new Digidesign AudioSuite plug-in format (see *MEC*, Nov/Dec '96), making it compatible with all Pro Tools 4.0 software packages (including Pro Tools Audiomedia and Powermix).



The second of these, **PurePitch** (see screenshot), is a TDM plug-in made by **Wave Mechanics**. It's the first plug-in to offer "formant-preserved" pitch correction in real time. (A formant is a combination of several frequency regions that together determine the characteristic quality of a vowel sound.) PurePitch offers various delay, modulation, and feedback parameters, and can even add or subtract expression from monotone dialog by affecting the pitch envelope of a voice track. Since formant-style pitch-shifting is the cool new feature to have, the big four Mac digital audio sequencer developers have released non-realtime versions of it: **Emagic Logic Audio 2.6 with the Time Machine II**, **MOTU Digital Performer with PureDSP** (see above), **Opcode Studio Vision 3.5**, and **Steinberg Time Bandit 2.5 with Voice mode**. So far only PurePitch and Auto-Tune offer realtime pitch-shifting. These new pitch plug-ins are a real gift for recording vocals. A bit flat on one note, a bit sharp on another? Need a chorus of voices for a section and the vocalist has gone home? No problem, because now you really can "fix it in the mix."



Digidesign's LoFi/SciFi/RectiFi ($395) provides Grungelizer-like features, such as down-processing for making a 16-bit audio file sound like low-fi 2-bit audio. Add analog synthesizer effects via the SciFi mode and you have the perfect plug-in for the techno, hip-hop, rap, and ambient/industrial music scenes. LoFi/SciFi/RectiFi is available for the TDM plug-in format (and soon for AudioSuite).

Plug-In Manufacturer Contact Information

AnTares Systems, P.O. Box 697, Applegate, CA 95703; 800-446-2356 or 916-878-6666; fax: 916-878-8577. ***Circle #152 on reader service card.***

Arboretum Systems, 915 Cole St., Ste. 387, San Francisco, CA 94117; 415-626-4440; fax: 415-626-4439; e-mail: info@arboretum.com; Web: www.arboretum.com. ***Circle #153 on reader service card.***

Digidesign, 3401-A Hillview Ave., Palo Alto, CA 94304; 415-842-7900; fax: 415-856-4275; e-mail: prodinfo@digidesign.com or techsupt@digidesign.com; Web: www.digidesign.com. ***Circle #154 on reader service card.***

Emagic, 13348 Grass Valley Ave., Bldg. C, Ste. 100, Grass Valley, CA 95945; 916-477-1051; fax: 916-477-1052; e-mail: emagic@emagicusa.com; Web: www.emagicusa.com. ***Circle #155 on reader service card.***

Mark of the Unicorn, 1280 Mass Ave., Cambridge, MA 02138; 617-576-2760; fax: 617-576-3609; e-mail: info@motu.com; Web: www.motu.com. ***Circle #156 on reader service card.***

Opcode Systems, 3950 Fabian Way, Ste. 100, Palo Alto, CA 94303; 415-856-3333; fax: 415-856-3332; e-mail: info@opcode.com; Web: www.opcode.com. ***Circle #157 on reader service card.***

Steinberg North America, 9312 Deering Ave., Chatsworth, CA 91311; 818-993-4091; fax: 818-701-7452; Web: www.steinberg-us.com. ***Circle #158 on reader service card.***

Wave Mechanics, c/o Wave Distribution, 50 Bordeaux Terrace, West Milford, NJ 07480; 201-728-2425; fax: 201-728-2931; e-mail: nextwave@haven.ios.com; Web: haven.ios.com/~nextwave/. ***Circle #159 on reader service card.***

Waves, 6716 Central Ave., Ste. 8, Knoxville, TN 37912; 423-689-5395; fax: 423-688-4260; e-mail: waves@waves.com; Web: www.waves.com. ***Circle #160 on reader service card.***

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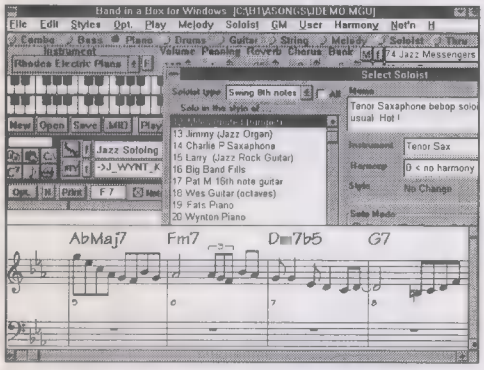

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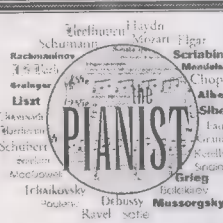
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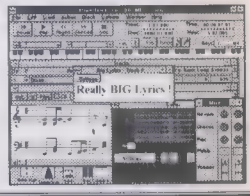

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MIDI ROCKS THE WEB

Some of the world's most successful inventions aren't necessarily new ideas, but rather innovative combinations of existing ones. Radio with pictures? Movies with audio? MIDI-powered soundtracks on the Web? It makes perfect sense if you think about it. MIDI has been phenomenally successful as a communications standard for electronic musical instruments. Similarly, the Web began as a text-based communication system for computer jocks. But while the Internet now offers a fairly exciting visual experience, most Web pages remain eerily silent.

Happily, the very factors that led to MIDI's success in music production make it ideal for breaking the silence on the Net. And several new technologies that build on MIDI promise to rocket the Web and other media to a dazzling level of interactivity. In this article, we'll discuss some of the current applications of Internet MIDI and take a peek at ones that are just around the corner. (Unfamiliar with MIDI? See the "MIDI Basics" sidebar on page 23.)

WHY USE MIDI?

Two words: compact and interactive. First, compact: The amount of data a typical 28.8kbps modem can process in a given amount of time is very small. You can see this every time you go to a Web site that has intense graphics: It can take a long, long time for them to load. Fortunately, MIDI files can be very small, especially compared with digital audio files. (Yamaha's Mike D'Amore calls MIDI "the most portable data format for the Internet.") MIDI files are so small that most of the playback engines out there will start playing the music well *before* the graphics have loaded. This makes for a more exciting interactive experience, which brings us to adjective number two: interactive.

Interactive media rely on the uninterrupted flow of data. As D'Amore puts it, "Digital audio doesn't take kindly to abrupt starts and stops," which are a common part of the interactice experience. One

BY DAVID KAPLOWITZ & DAVID BATTINO

of the beauties of interactivity is that the user is in control and has the luxury of jumping around to whatever portion of the application he or she desires at any moment. MIDI music, because it's created on a note-by-note basis, is ideal for the quick musical changes that go along with the interactive experience.

Netscape 3.0 ships with a plug-in called LiveAudio that enables realtime playback of MIDI files, so if you happen upon a site that has MIDI, it will play automatically. Poke around the Netscape site for more information and a short demo of what LiveAudio can do. (Explorer 3.0 has built-in support for MIDI playback, though available ActiveX Controls include LiveUpdate's Crescendo and Yamaha's MIDplug.)

LiveAudio

GET YOUR SYSTEM READY FOR MIDI

Whether you're using a Mac or a PC, start by downloading or buying a Web browser such as Netscape 3.0 (although at the time of this writing, 3.0 was a bit unstable, to say the least — just give it lots of memory and hope for the best). Netscape 3.0 requires a PC with a 386 or higher processor and Windows 3.1, 95, or NT, or a Macintosh with a 68020 or higher processor and System 7. The minimum RAM required is 4Mb for Windows 3.1, 6Mb for Windows 95 and NT, and 12Mb for Macintosh. (You can download the latest version of Netscape at www.netscape.com/.)

An alternative to Netscape is Microsoft Internet Explorer. It also runs on both PC and Mac platforms. For Windows 3.1, you'll need 4Mb of RAM and at least a 386 processor. Windows 95 requires 8Mb of RAM and at least a 386DX processor. On the Mac, Explorer needs System 7.1 or greater and 8Mb of RAM. (You can download the latest version of Explorer at www.microsoft. com/ie/default.asp.)

Both programs allow you to add software modules (called "plug-ins" by Netscape and "ActiveX Controls" by Explorer) that bring new functionality to the host program. When you arrive at a Web page that uses a plug-in or an ActiveX control, both programs check to see if you have the necessary module installed. If you don't, Netscape transfers you to a page with a list of appropriate plug-ins; you must then download one into your plug-ins folder and restart Netscape for it to take effect. Explorer automatically installs the appropriate ActiveX Control for you.

Fig. 1. *Above are some playback control panels you may see when you surf into a Web site with embedded MIDI files. Clockwise from top: Yamaha MIDplug, Wildcat Canyon Web Tracks, LiveUpdate Crescendo, and LiveAudio.*

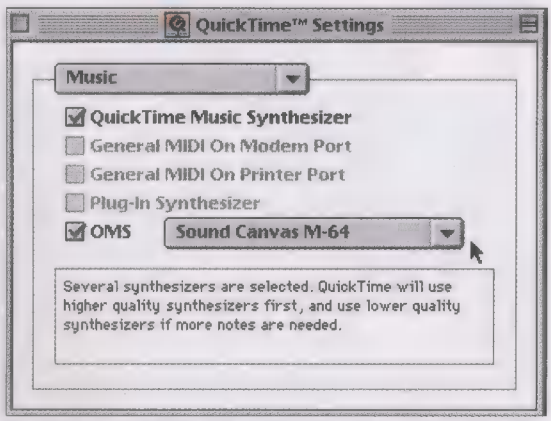
QuickTime™ Settings
Music
QuickTime Music Synthesizer
General MIDI On Modem Port
General MIDI On Printer Port
Plug-In Synthesizer
OMS
Sound Canvas M-64
Several synthesizers are selected. QuickTime will use higher quality synthesizers first, and use lower quality synthesizers if more notes are needed.

Fig. 2. *When OMS is loaded, the QuickTime Settings Control Panel lets you choose an external synthesizer for MIDI playback. Here we've selected a Roland Sound Canvas synth module. (OMS is a free MIDI operating system extension that learns your MIDI setup and handles realtime communication between programs.)*

LiveAudio is a *playback engine:* It enables the playback of MIDI files, but you still need a sound source, whether it's a soundcard like the Sound Blaster, an external MIDI tone module like a Roland Sound Canvas, or a software synthesizer like Yamaha's MIDplug. (Although all digital sounds are software-based, we'll distinguish between a software synthesizer and a soundcard/tone module by noting that the software synthesizer's sound is created by the computer itself, not a dedicated synth chip.) Most of our sources say that things are definitely moving toward software synthesis, especially as faster computer processors appear.

In general, each playback engine has a control panel that appears somewhere on the Web page and gives the user control over start, stop, and volume. Figure 1 shows a variety of control panels.

LiveAudio is perhaps the easiest solution on the Netscape platform, but other playback engines include Headspace's Beatnik Browser Plug-In, Yamaha's MIDplug, Microsoft's Interactive Music Control, LiveUpdate's Crescendo, and Wildcat Canyon's WebTracks. One difference you'll notice is that LiveAudio doesn't *stream* MIDI data. Every time new music is to be played, LiveAudio needs to spend a second or two importing the file. The other playback engines are generally capable of streaming data, starting the computer or sound module playing the music as soon as they start receiving information.

On the Mac side, LiveAudio uses Apple's QuickTime software synth as a sound source. Since version 2.0, QuickTime has come with a General MIDI sound set called QuickTime Musical Instruments (QTMI), based on the Sound Canvas sounds. You'll want to get version 2.5, which performs significantly better than 2.0, and also includes such cool components as QuickTime VR and the QuickTime VR Netscape

QuickTime™

QTMI

plug-in. These components allow 3D object rendering for some impressive visual possibilities. Version 2.5 also supports the Open Music System (OMS), so you can play back MIDI files using any synthesizer in your setup (see Figure 2).

The latest version of QuickTime is available in a number of places, but the easiest site from which to download the whole shebang is www.quicktime.apple.com/sw/. OMS is available at www.opcode.com/oms/.

QTMI sounds pretty good, but not great, and it's a bit of a processor hog, slowing the Mac down when in use. It's definitely usable, but as far as sound quality goes, for the real deal you'll probably want to check out what Headspace, Yamaha, and/or Microsoft have — or will soon have — to offer.

On the PC side, LiveAudio uses your soundcard as a sound source, so if you have a card installed along with Netscape 3.0 and the LiveAudio plug-in, you should hear music when you arrive at a Web site that includes MIDI. QuickTime is also available for Windows machines, although it's currently stuck at version 2.1. Apple says that Windows version 2.5 should be available soon, and starting with version 3, the Windows and Mac versions will be synchronized.

As some of the companies that are working on realtime MIDI on the Internet will be quick to say (and have said), software synthesis "is an emergent technology and not without its quirks." It is entirely possible that you may experience weirdness like digital glitches or notes that sustain forever, especially if your computer and/or modem are slow.

When you enter the Mouse Jam page, MIDI music starts playing. Clicking on the buttons below drops in sound effects and solos from a guest artist.

MIDI BASICS

Back in the early '80s, five synthesizer companies got together and agreed (!) on the MIDI specification, creating a standard that has since been embraced by hundreds of companies and thousands of musicians. MIDI (the Musical Instrument Digital Interface) is a communications protocol for musical instruments and computers. The idea was to enable electronic instruments to control other instruments, computers, and hardware devices.

When you press a key on a MIDI keyboard, a digital signal is sent out of the keyboard's MIDI Out jack, carrying performance information: the note number (Middle C is note number 60), the velocity (how hard you struck the key), and so on. This data can be used to play additional MIDI instruments via remote control, creating a bigger sound — simply connect the master instrument's MIDI Out to the slave instrument's MIDI In.

The MIDI data can also be recorded to a computer in real time, using *sequencer* software. Sequencers are like a hybrid of tape recorders and word processors: Once the MIDI data is in the computer, you can correct wrong notes or sloppy timing, and alter the tempo, note durations, pitch, and even the sound with which the notes play back. You can create bizarre and physically impossible musical passages and completely automate your mix: Adding gradual crescendos or emphasizing individual notes is easy.

The finished composition, or *sequence*, can be saved as a *Standard MIDI File* (SMF) and posted on the Internet for other people to download and play back on their MIDI instruments. (See the Nov/Dec '96 *M&C* for more on MIDI files.) Alternatively, the new Internet technology described in the main article allows Web users to hear MIDI files directly from the Net without first downloading them.

The abstraction with MIDI that sometimes confuses people is that a recording of a MIDI performance is not an audio recording — it contains just control data, not actual sounds. When you record a performance into a track of a MIDI sequencer, that track contains information on the notes you played, such as "At bar 6, beat 1, clock tick 241, he played *F*#4 with velocity 67." Playing back a MIDI track without a MIDI instrument connected yields silence.

Oops — Wrong Sound. Most synthesizers today have memory banks that store hundreds of sounds (also called *patches, programs,* or *presets*). Sending MIDI events called Program Changes will call up different patches, but manufacturers are free to put any sound they want in any memory location. This can lead to some nasty surprises, such as the flute solo being played back by a nuclear explosion when MIDI file A is played on synthesizer B.

What was needed was a standardized way to lay out sounds in memory, and in 1991, the General MIDI (GM) standard was developed. GM specifies 128 pitched (melodic) sounds and 47 drum sounds that all GM synths must have, as well as their locations. It also stipulates other requirements, such as minimum *polyphony* (the number of simultaneous voices an instrument can play). When you play back the same GM sequence on two different GM-compatible devices, it will sound similar (though often far from identical).

Most synthesizers released in the last few years are General MIDI capable, and if they're not compatible out of the box, you can probably get your hands on a set of sounds that approximate the General MIDI sound set. (For example, a General MIDI set for the Kurzweil K2000 synth is available on Kurzweil's Web page, www.youngchang.com/kurzweil.)

General MIDI soon became the standard in PC soundcards. It also turned up in software synthesizers like Apple's QuickTime Music Architecture (QTMA), which contains a disk-based set of sounds called QuickTime Musical Instruments (QTMI). These two products — QTMI and GM soundcards — are currently the dominant sound sources for MIDI playback on the Internet and other interactive media, although new contenders are appearing all the time, and external synth modules usually provide better (if costlier) performance.

MIDI ROCKS THE WEB

LIVE UPDATE CRESCENDO

Crescendo is another MIDI playback engine that uses QTMI or a PC soundcard for playback. It runs on Netscape and Explorer in both MacOS and Windows. For $19.95, you can download Crescendo Pro, which supports MIDI streaming — playback begins as soon as the first byte of data is received. (The free basic Crescendo engine supports streaming on LiveUpdate's Web site, www.liveupdate.com, so you can try before you buy.) Pro also supports MIDI Sys-Ex messages, which can be used to alter sounds on a target synth module.

LiveUpdate will soon release their own software synthesizer, Crescendo Plus. Their goal is to have "music on every Web page."

WILDCAT CANYON WEBTRACKS

WebTracks, another MIDI playback plug-in for Navigator/Explorer/Mac/Windows, also uses QTMI on the Mac side and a soundcard on the PC to spin its musical magic. It's a quick download, an easy install, and it seems to work well, although there's nothing too flashy here — basically just playback using the prevalent sound source for each platform. It *is* very quick — MIDI starts playing nearly immediately after you get to a page. WebTracks also provides a small control panel for volume. You can download it at www.wildcat.com.

Although explaining how to post MIDI files on a Web page is beyond the scope of this article — that would require a descent into HTML programming — we should mention one super-easy method: Wildcat's Internet Music Kit ($49; currently Windows 3.1 and 95 only). It's the slickest way we've seen to get music up on your Web site. In a simple three-step process (see Figure 3), you import a MIDI file or create one by dragging synchronized musical phrases onto a grid in the bundled DoReMix program. (DoReMix and its library of hundreds of phrases was licensed from Roland.) The software then converts the MIDI file into Wildcat's WebTracks format. Next, it puts the music on your Web page using the "automated Embed Wizard." During the embedding process, you can specify the location and look of the WebTracks control panel.

YAMAHA MIDPLUG

Yamaha has been working hard to evangelize its XG format, a superset of General MIDI that offers more sounds (540), more polyphony (32 voices), on-the-fly sound editing, and three realtime signal-processing effects. What better way to convince the public of XG's quality than to implement it in a software synth and give it away for free on the Net? After people experience it in their own homes, Yamaha must have figured, they'll be more apt to search out the XG logo on Yamaha's hardware instruments and soundcards, as well as on computer games and music software.

MIDplug, a plug-in for Netscape and Explorer that plays back MIDI files using its own built-in sound set, is the first step on this path. MIDplug will only run on a Pentium or a Power Mac. It uses a fairly large sound set (about 2Mb), and sounds great — the drum sounds are especially clean. The downside of MIDplug is that it's processor-intensive, using up to 50% of your computer's processing power (the fact that it only runs on Pentiums and Power Macs is a hint). Everything in Netscape slows down when MIDplug is playing a MIDI file — we ran a QuickTime VR animation with and without MIDplug, and the speed difference was significant.

Nonetheless, MIDplug sounds really good. And in December '96, Yamaha updated the Windows version, splitting MIDplug into two components: the interface to Netscape (MIDplug) and the actual software synthesizer (fetchingly named the S-YG20). This means that updating the software will be easier and that MIDplug can now be used offline. To your Windows machine, MIDplug now looks just like a soundcard, so it can be used as the sound source for all your games and applications. Yamaha is currently working on the update to the Mac version. The new version includes a higher resolution sound set, which means it sounds even better.

With 360 sounds and one effect, MIDplug is not yet up to the full XG spec (Yamaha classifies it "GM+"), but as CPU power increases, MIDplug's capabilities should grow as well. As we went to press, Yamaha announced S-XG50C, a version of the software synth that runs on Intel's new Pentium MMX processors and delivers much better performance. ►

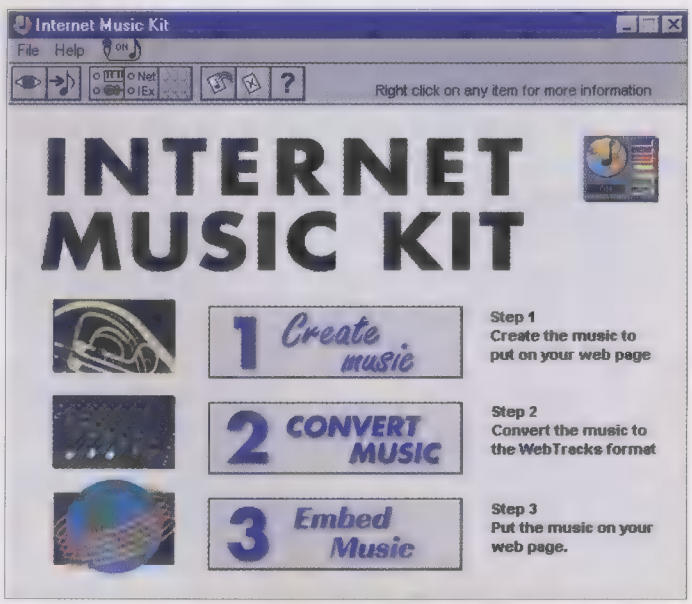
Internet Music Kit
File Help
Right click on any item for more information
INTERNET MUSIC KIT
1 Create music
Step 1
Create the music to put on your web page
2 CONVERT MUSIC
Step 2
Convert the music to the WebTracks format
3 Embed Music
Step 3
Put the music on your web page.

Fig. 3. *Wildcat Canyon's Internet Music Kit is the slickest way we've seen to post music on your Web site. First, you import a MIDI file or have the program compose one for you. Next, the program converts it to Wildcat's data format and embeds it in your page, with no messy HTML scripting.*

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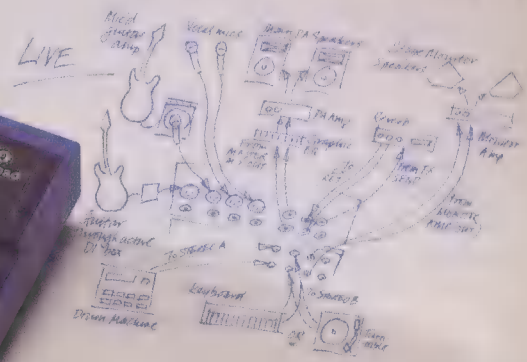
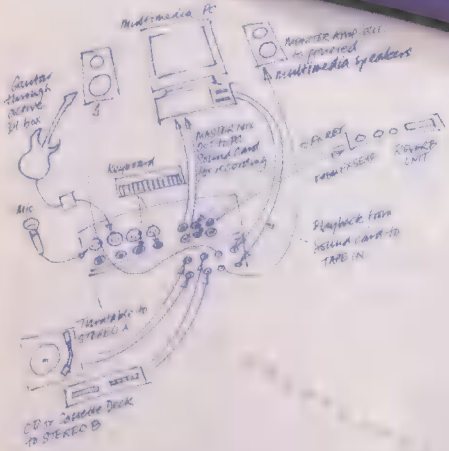


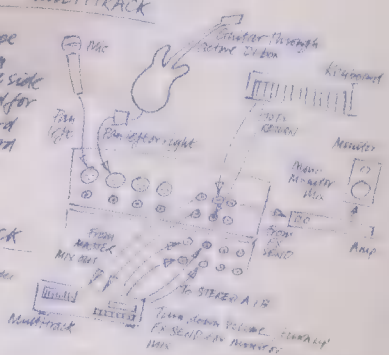
MULTIMEDIA

Recording and playback of music using a PC fitted with stereo sound card

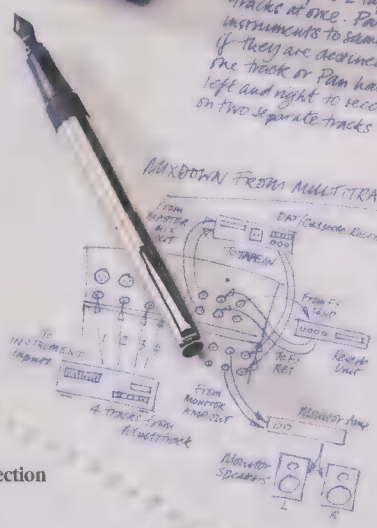


RECORDING TO MULTITRACK

Record up to 2 tape tracks at once. Pan instruments to same side if they are destined for one track or Pan hard left and right to record on two separate tracks



MIXDOWN FROM MULTITRACK



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• Outputs	+21 dbu max typical
• Noise	-85 dBu typical
• Freq Response	20Hz - 20kHz
• THD	<.0005% typical

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- Video Post Production
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- Location Mixing

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MIDI ROCKS THE WEB

Once you've installed MIDplug, arriving at a site that's set up for playback using MIDplug will bring up a small control panel (see Figure 1 on page 22) which provides basic control over playback and volume and displays the name of the MIDI file being played. MIDplug is well documented, with clear instructions about how to embed a MIDI file into a Web site. You can download it (about 2Mb compressed) from www.ysba.com.

There are many MIDI playback plug-ins out there. The ones we've mentioned here work well. Experiment and see which one you like best — you can download all of them and switch between them in your Web browser to evaluate the differences. If you run into configuration problems, you should be able to solve them quickly by visiting the troubleshooting section of the plug-in manufacturer's Web site. LiveUpdate's site in particular is well done: It offers a step-by-step tutorial with clickable examples.

FOLLOW ME

Earlier, we touched on the other exciting application of Internet MIDI — interactivity. Some of the most interesting ideas come from Microsoft and two small companies, SSEYO and Headspace. In demonstrations we've seen, Web surfers can trigger musical phrases, alter the mix, or transpose and otherwise mutate online music just by waving the mouse over a graphic.

Microsoft is working on some very powerful and intelligent software for MIDI music. As part of the plan, they recently licensed the Roland Sound Canvas sound set and announced that it will be included in their DirectMusic architecture, making consistent MIDI-based audio playback available to developers and users. The Microsoft Network online service (MSN) is already using the Roland sounds to great effect for realtime music. Todor Fay, the technical lead of Microsoft's Interactive Music team, says this deal was important because the "standardized Sound Canvas sound set will ensure quality and consistency." (Currently, one of the biggest problems with General MIDI is that it's too general — for example, the Distortion Guitar preset on two GM synths can sound wildly different.) Having a built-in sound set, particularly one based on the Sound Canvas, which has emerged as the standard of this non-standard, should go a long way toward making MIDI music more popular.

The other side of Microsoft's work is the Microsoft Interactive Music Architecture, a set of tools for the "intelligent creation of MIDI-based music for the Internet and other interactive media." These tools are aimed at anyone who wants to get music onto a Web page, musician or not. Todor Fay says the philosophy is not to look at MIDI clips as finished products, but to focus on the techniques for creating those clips. They've built a system that "knows" about music, drawing from a knowledge base of styles to come up with music on its own. Let's see what he means. . . .

The Microsoft Music Producer (we'll call it MMP) is available at www.microsoft.com/musicproducer/start.htm. MMP creates a piece of music from a number of parameters that you define. (See Figure 4 on page 28.) The parameters include time (the length of the music), style (classical, funk, jazz, rock, etc.), shape (the rise and fall of the music's intensity), personality (the mood within a style, like sad, hopeful, or ridiculous), and the band (the sounds that will play the composition). MMP takes these parameters and very quickly composes a piece of music.

While impressive, this technology also sounds a little frightening — is this the end of the composer? What's the composer's role in software that creates the music for you? Well, composers created all the styles available in MMP. Although the

CLICK HERE

Ready to rock the Web with MIDI? Punch up these links. For your convenience, we've also posted them on the Links page of the M&C Web site (www.music-and-computers.com). Special thanks to Scott Garrigus (www.pan.com/garrigus/) and Horizon Public Relations (www.horizonpr.com) for their suggestions.

WEB BROWSERS

Microsoft Internet Explorer: www.microsoft.com/ie/default.asp
Netscape: www.netscape.com/

PLUG-INS & PROGRAMS

ActiveX: www.microsoft.com/activex/controls/
Apple QuickTime: www.quicktime.apple.com/sw/
Full Tilt NetSessions: www.fulltiltdesign.com
Headspace RMF and Beatnik: www.headspace.com/
LiveUpdate Crescendo: www.liveupdate.com/
Microsoft Interactive Music Control: www.microsoft.com/music/
Microsoft Music Producer: www.microsoft.com/musicproducer/
OMS (Open Music System): www.opcode.com/oms/
SSEYO Koan: www.sseyo.com
Wildcat Canyon WebTracks and Internet Music Kit: www.wildcat.com
Yamaha MIDplug: www.yamaha.com

REALTIME MIDI SHOWCASE

Cool Crescendo Site of the Day: www.liveupdate.com/sod.html
The Christmas Jukebox: www.twoc.com/jb/juke.html
MIDplug Sample Galleries: www.yamaha.co.jp/english/xg/html/mid3.html; www.ysba.com/midplug_links.html
Mouse Jam: www.mousejam.com
QuickTime Samples: www.quickTime. apple.com/sam/
Shag for Pres, the Yellow Dog Candidate: www.awod.com/gallery/rwav/shag/
Web Thumper's MIDI Page: www.webthumper.com/midi/

MIDI RESOURCES

Harmony Central MIDI Resources: www.harmony-central.com/MIDI/
Keyboard Central: www.keyboardmag.com
Macintosh MIDI User's Internet Guide: www.aitech.ac.jp/~ckelly/mmuig.html
MIDI Home Page: www.eeb.ele.tue.nl/midi/
MIDI Manufacturers Association: home.earthlink.net/~mma/
MIDI/computer configuration tips (Windows): www.voyetra.com/sitespec.htm
MIDI/computer configuration tips: www.liveupdate.com/tshootcr.html
MIDIfy Your Page (features a tutorial and examples): www.ysba.com/midplug_midify_index.html

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details of how these styles are created are shrouded in secrecy and all the composers working with this technology are currently in-house at Microsoft, suffice it to say that the technology will be evolving quite a bit over the coming months. [*Ed. Note: MMP is an evolution of AudioTracks Pro, a music-generation program developed at Fay's old company, The Blue Ribbon Soundworks. Microsoft acquired Blue Ribbon in 1995.*]

Just out from Microsoft is Interactive Music Control, an ActiveX control for Explorer. Interactive Music Control incorporates this intelligent music composition technology into the interactive aspect of the Internet. In English, this means that the software knows about things like how long you've been at a Web site and can change the music or transition into new music dynamically at any point in time. Interactive Music Control can also do things like morph a currently playing piece of music into a piece that's in the next page you go to. The software can compose music on the fly, so the musical experience is different every time. And over time, a piece can evolve based on the parameters described earlier.

IMC also uses Microsoft's Sound Canvas/GS-compatible software synthesizer.

KOAN GET IT

Drop by SSEYO's Web site (www.sseyo.com), and you'll find it packed with testimonials to their Koan series of programs, which generate continuously evolving MIDI soundtracks. (Brian Eno: "The works I've made with Koan symbolize to me the beginning of a new era in music.") Our favorite quote likened Koan to an "audio lava lamp," which would be a welcome relief from the incessant four-bar loops you hear in much MIDI music.

The flagship Koan Pro (about $250) produces music based on about 150 parameters ranging from Harmonization Type to Mutation Factor. (See Figure 5.) Some parameters can change automatically over time. A new trio of Koan products, Koan X Silver (free), Gold ($30), and Platinum ($50), provides "drag 'n' mix" interfaces but far fewer parameters. All four packages save files as compact "Koan Pieces" that can be embedded in a Web page and played back on a MIDI synth via a free Koan plug-in or ActiveX Control. Koan pieces are actually smaller than MIDI files, since they contain just instructions for the Koan engine to generate MIDI data on the fly. The ActiveX version allows realtime control of musical parameters with the Web surfer's mouse. All versions support SoundFonts (Creative Labs' downloadable audio sample format) and have special hooks for Yamaha's XG and Roland's GS extensions to General MIDI. This lets Koan alter the sound itself through MIDI-controlled filtering and other synthesis techniques.

Currently, Koan runs on both Netscape and Explorer, but only under Windows. However, several Mac users have posted messages saying they were able to run the program using SoftWindows.

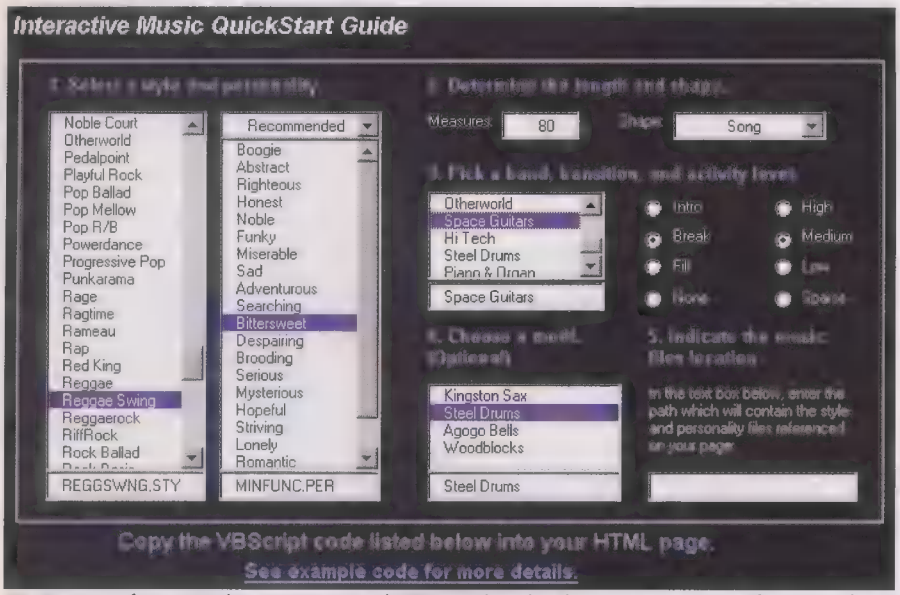


Fig. 4. *Microsoft Music Producer creates original MIDI music based on the parameters you specify. You can download the program from www.microsoft.com/musicproducer/.*

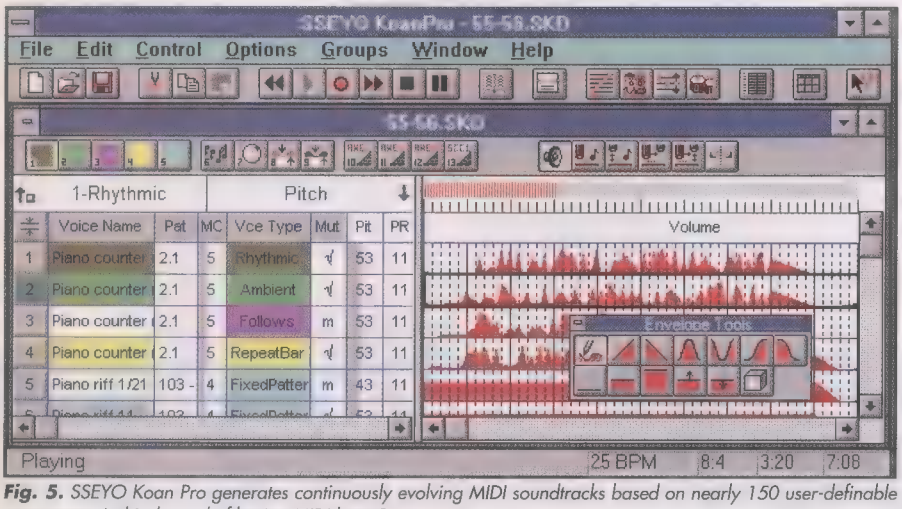


Fig. 5. *SSEYO Koan Pro generates continuously evolving MIDI soundtracks based on nearly 150 user-definable parameters. Is this the end of boring MIDI loops?*

HEADSPACE & THE RICH MUSIC FORMAT

Some of the most exciting prospects for realtime MIDI on the Internet (and other interactive media) are coming from a California-based company called Headspace, which was founded by musician/producer Thomas Dolby. The scope of what Headspace is setting out to do is large; it promises to be the most robust of the currently available solutions for realtime MIDI on the Internet.

Headspace's core technology is called the Rich Music Format, and it's designed

to run on everything from WebTV to the BeBox computer. RMF can be thought of as an interactive MOD file, in that it contains three parts: sound samples (like AIFF or .WAV files), playback instructions (like a MIDI file), and specifications for interactivity. Moving the cursor over an icon on a Web page can control playback tempo, EQ, pitch, and so on.

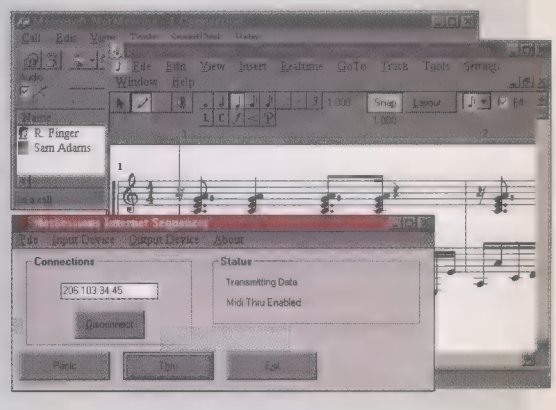
In other words, RMF integrates a number of existing media formats and other information into a single file. One RMF file could contain a MIDI file with several variations, voice samples, and even copyright fields with text about the music and composer. RMF is meant, among other things, to expand the scope of General MIDI and to provide a high level of consistency between platforms so that the music playing on your PC will sound the same as the music playing on your friend's Mac.

The initial plan for RMF was to use existing General MIDI sound playback engines such as QuickTime Musical Instruments or soundcards. However, Dolby

INTERNET MIDI JAM

Here's an interesting coincidence: Today's 33.6kbps modems are faster than MIDI. **Full Tilt Design**'s **Net Sessions** software ($65) takes advantage of increasing modem speed to let you jam in real time with other musicians over the Internet. Each person needs a MIDI instrument, a computer, and a TCP/IP connection to the Internet or a LAN. As each musician plays, the MIDI information is transmitted to the other members, received by their computers, and played by their MIDI instruments. A two-player version called Net Sessions 2 is currently available.

Net Sessions Pro, which will interface with existing sequencer software to allow remote recording, is on the way. With Pro, one user in New York could start his sequencer recording, and his friend in San Francisco could add a new track. The software uses special synchronization techniques to compensate for the time delay caused by the speed of the Internet connection. Net Sessions Pro will be offered at a discount to registered Net Sessions 2 owners. You can download Net Sessions PreView, a free demo version, from Full Tilt Design's Web site. **Contact:** Full Tilt Design, Box 211, Spaniard's Bay, Newfoundland, Canada A0A 3X0; 709-749-6536; fax: 709-786-6112; e-mail: andrewm@newcomm.net; Web: www.fulltiltdesign.com.



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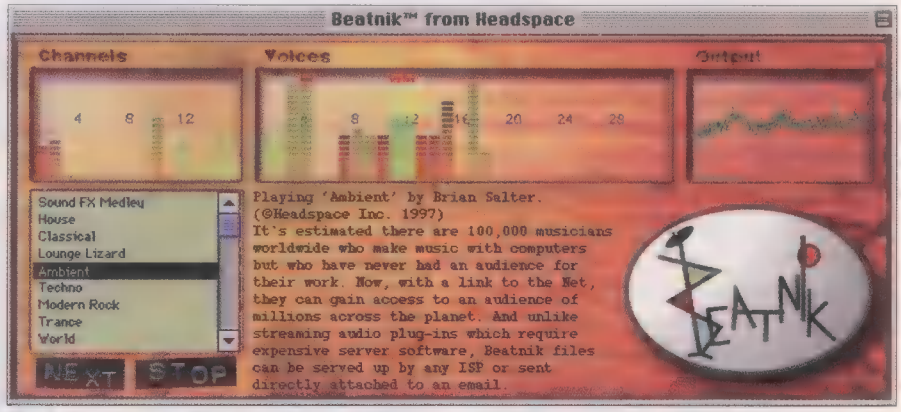
wasn't satisfied with General MIDI. "MIDI is the right idea, but the wrong implementation," he notes. "It's economical and supports realtime interaction, but for a format to work on the Net, it needs to have a more exact description of the sonic composition than today's General MIDI specification. The disparity between different soundcards is appalling. That's why we created RMF."

That's also why Headspace recently acquired Igor Labs and its software synthesizer. This addition to the RMF concept makes it a complete system for Internet-based MIDI and audio playback. Headspace's synth sounds much better than QuickTime Musical Instruments and almost as good as Yamaha's MIDplug, but its main advantage is that it is extremely efficient with respect to processing power. It won't slow your system down nearly as much as some other software synths out there. (Headspace estimates it uses 1% of the CPU power for each voice.) And unlike MIDplug, Headspace's synth also supports the playback of custom samples, so composers aren't locked into a particular sound set. Expect this feature to show up on other software synths soon. (The Headspace architecture also lets you use an external synth for playback.)

MORE RMF ADVANTAGES

One of the really cool things about RMF is that it "decouples" the roles of composer and programmer during the creation of Web sites or other interactive media. Say, for example, you're the composer for a new Web site or interactive game. In the past, you would have had to work *extremely* closely with the Web designers, because if they needed a simple tempo change to make a piece of music fit a scene, they would have to come back to you to get that change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It's estimated there are 100,000 musicians worldwide who make music with computers but who have never had an audience for their work. Now, with a link to the Net, they can gain access to an audience of millions across the planet. And unlike streaming audio plug-ins which require expensive server software, Beatnik files can be served up by any ISP or sent directly attached to an email.
BEATNIK

Fig 6. *Beatnik, new software from Thomas Dolby's company Headspace, combines MIDI, digital audio samples, and interactivity in a single file format.*

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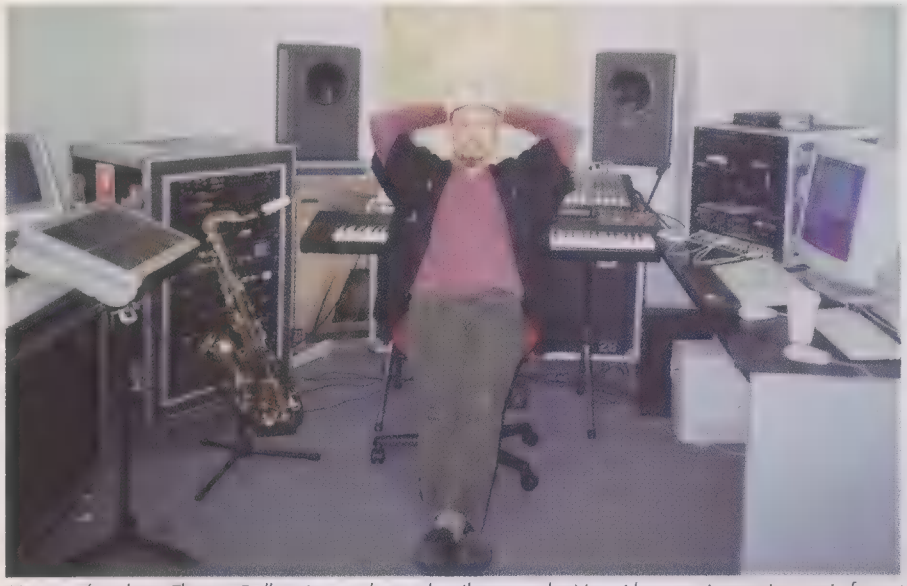

Musician/producer Thomas Dolby aims to shatter the silence on the Net with a new interactive music format called RMF.

made. RMF allows the Web site programmer access to what Headspace calls the "safe" parameters of a piece of music, meaning volume and tempo, without having to come back to the composer. This frees up both composer and programmer to do what they do best and will make the whole process much more efficient. The composer can also set the range of variation the programmer can make.

RMF also provides some enticing security/copyright measures. For example, a piece of music could be licensed for use on one Web site, displaying a warning message if played anywhere else. And if a file contains MIDI data and/or audio tracks created by different people, the RMF file can contain discrete copyright information for each composer/sound designer. This information is encrypted into the file with 40-bit precision, making it extremely difficult to strip out.

Another cool thing is that RMF files can contain biographical information on the composer (or sound designer or anyone else involved with the file) and direct links to their Web site. This is potentially a very strong marketing tool for musicians. For example, suppose multimedia producer Joe Bigg arrives at a random Web site that has your atonal trance-Zappa tune playing in the background, and he's really into it. Joe can open a link to your Web site and contact you about doing the music to his next Bigg thing.

BEATNIK: RMF FOR EVERYONE

Just days before we went to press, Headspace announced Beatnik (see Figure 6), an application that imports MOD, .WAV, AIFF, and MIDI files and churns out RMF files. They also announced the Beatnik Browser Plug-In, which enables Web browsers to play back RMF files. The uncompressed floppy disk Headspace distributed at the press conference contained not only the software synth and sounds, but also about 20 minutes of music. You can download the demo from their Web site (www.headspace.com). Prepare to be amazed.

The initial version of Beatnik will contain the full 128 General MIDI sounds plus a bank of 128 sound effects and 50 "Groovoids," miniature musical phrases. Like a MIDI sampler, the Beatnik Editor allows you to assign audio samples to specific notes, and lets you program synthesizer functions like LFOs and envelopes.

Headspace says that Beatnik will "coexist just fine" with other plug-ins like RealAudio and Shockwave Audio (see the Jan/Feb '97 *M&C*) and also integrates with Opcode's OMS MIDI operating system for use with external synthesizers.

THE FUTURE

Everyone agrees that MIDI is extremely efficient with regard to streaming data over the Internet, which is why it's getting a lot of attention now. One thing that will almost certainly occur in the coming months is the debut of more software synths that aren't limited to the General MIDI sound set. They will include multiple sound banks, leading to more sonic diversity in the MIDI compositions that we'll hear on the Web. In addition, all the major developers of Internet MIDI technology agree that faster processors are going to enable better sound sets and more efficient playback engines.

Fred Putnam and Bill Moline at LiveUpdate see strong possibilities on the commercial front — music behind banner

The Headspace staff has produced music and audio software for clients ranging from Netscape to WebTV.

advertising on the Web and the purchase of music through the Internet. They also feel that artists need to start thinking about creating a MIDI version of all their music releases that can be easily used for interactive purposes.

Most of the people we talked to who are working on this technology say that the amount of really interesting MIDI stuff out there is still slim, but that things will be changing rapidly in the next year. One application in the works is interactive online music lessons, which will incorporate MIDI as the main source of sound and interactivity. When these programs come to fruition, you'll be able to play passages from a MIDI keyboard and receive feedback on your playing in real time. And karaoke sites will benefit — all the music will be MIDI-based, and song lyrics will pop up, synchronized to the music.

The software Todor Fay and his team at Microsoft are working on promises to be very powerful and to help a lot of people who aren't necessarily musically inclined to get music onto Web pages. Along the lines of what the other major players have said with regard to MIDI on the Internet, Todor asserts, "This is just the tip of the iceberg."

Christmas year-round: Clicking on the jukebox launches a variety of MIDI carols.

When asked about potential applications for MIDI on the Internet and other interactive media, Thomas Dolby replied, "For advertisers, training, telephony, notification, sonification, and user interface design, there is a gaping hole where sound ought to be. Whatever the message you're trying to convey, you can say it better with music and sound. Audio has always been a poor relation to PCs, and the Web has widened the gap even further. The only solution is a platform-independent, system-independent, one-stop shop, designed by musicians, not engineers. I haven't been this excited since the early '80s, when I heard all American cities would be wired with cable TV and there'd be a 24-hour music channel."

So check out what's out there — MIDI-based music on the Internet could make your Web experience much more complete.

David Kaplowitz is a San Francisco-based composer/sound designer/engineer and co-owner of Found Sound, a multi-faceted recording facility. Found Sound's Web site is under construction, and just might include some MIDI stuff. He can be reached at fndsound@sirius.com.

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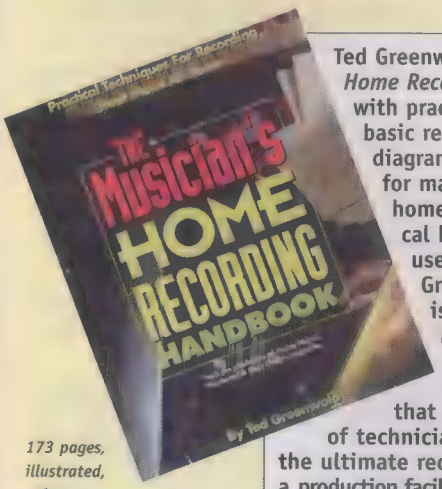

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Musical Robots Attack Europe!

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Prolog: April 1983. My friend Chico MacMurtrie and I are dragging the plastic tubes we recently found in the trash through the halls of the University of Arizona's music department. We part the sea of puzzled glances, nodding at my fellow music majors as we stumble down the stairs, and with as much dignity as possible, cram our absurd and ridiculously long "instruments" into the electronic music studio. The strange groans, cries, and unworldly grunts we somehow extract from those

by Mark Ruch

PHOTO: DOUG ADESKO

Musical Robots Attack Europe!

plastic tubes make their way to tape, and, after a delicate mixing session, manage to secure another "A" in Dr. Miller's Electronic Music class.

Chico and I are now the artistic and managing directors of Amorphic Robot Works. Amorphics is one of a growing number of "machine art" groups that have discovered the benefits of using MIDI control and off-the-shelf software to program robots and mechanical devices. In August '96, along with the eight other engineers and programmers in our group, we launched a successful and stressful three-month tour of Europe. Believe it or not, those ancient plastic tubes are still an integral part of the sound. These days, however, the tubes have been transformed into drums played by humanoid robots. The robots and other machines are controlled with a Macintosh PowerBook, custom hardware that translates MIDI commands into signals that trigger the robots, four MIDI keyboards, and Opcode Studio Vision and Max software. [*Ed. Note: For more on programming with Max, see the Sept/Oct '96* M&C.]

Attack!

About 400 people have just entered the Muffathalle theater in Munich, Germany. They crowd around large mechanical set pieces and skeletal humanoid sculptures, which wait in pools of light for the compressed air, hydraulic fluid, and low-voltage electricity to hit the web of cables, connectors, and hose. On a platform behind the audience sits a Macintosh PowerBook 520C with 20Mb RAM running Max 3.0 and Studio Vision Pro 3.01. Amorphic programmer Brian Kane calls up the master Vision file, which contains multiple sequences. To his right, Chico and Amorphic artist Janette Wernegreen prepare to play four MIDI keyboards that override the computer when improvisation and jamming are needed. The live and sequenced MIDI data is mapped through Vision and then sent to Max, which is running in the background. As the audience settles in, I call for blackout and bark the first machine cue: "String Body — go!"

With a click on the Mac's "A" key, the seven-foot String Body robot begins pulling his Nosferatu fingernails across the 40-plus oddly tuned guitar and koto strings that stretch the length of his rotating, cylindrical torso. After a few strums, the sequence activates his now outstretched "bass arm," and the 12-volt motor that drives his left thumb begins picking deep, warbly whole-notes. Brian begins to play and overlap other sequences. The now-actuated pneumatic valves send measured portions of compressed air to cylinders, which act as tendons pulling and releasing the arms, shoulders, and legs of various robots. The Taiko Drummer pounds out ones and threes on those aforementioned tubes with such force that a woman standing next to him shrieks.

Another robot locks into the 4/4 with his castanets; Tabla Player and Drumming and Drawing Sub-Human flail with abandon. Motors bring the stick-figure "Kids" to life, causing them to twitch in a cacophonous dance. The ape-like pant-hoot calls of The Gek beckon from the 15-foot, glowing Hydraulic Tree robot as the percussion players settle into a tribal backbeat.

Way off on the far side of the hall, the huge Mountain-Making Machine has begun to lift two of its clover-like arms and two Dog-Monkeys (part dog, part monkey — you guessed it) launch out from underneath, forcing the startled audience to move towards the center of the room. The strategy here is to clear out a safety zone for the Tumbling Man, who is next out. He hits the floor, looking like the product of a haphazard gene-splice between a gymnast and a jackhammer. The resulting audience migration eclipses in near panic when the Too Big Dog Monkey (a 30-foot hydraulic Dog-Monkey), begins to close in from the opposite side. The drumming builds in intensity, and the sounds migrate through the space and envelop the audience. The audience, out-flanked, surrounded, and penetrated, peels off in various directions like a disrupted school of fish.

Chico grins like a raccoon as he steers the smaller Dog-Monkeys through the audience, triggering their steps on the MIDI keyboards. The keyboard notes override the sequences and are used for programming sequences much the way a keyboard player would enter a MIDI piano part. Playing these keyboards sets an entire room of

Why MIDI?

One of the many advantages of controlling machines with MIDI is the ease with which a programmer can synchronously control multiple *actuators* — the motors, valves, pumps, and solenoids that make the machines move. In *The Amorphic Evolution* show, we use one controller box with 112 outputs to control about 60 machines. This ease of use becomes extremely important since a typical machine may have anywhere from two to 24 actuators requiring input.

Another big advantage is cost. Without MIDI, it would be nearly impossible to program a performance of this scale without spending a fortune (as well as countless hours) on customized software and programming. Before we used MIDI, we had been able to sequence movements for three to four machines at a time — with the help of some brilliant programmers. All of the code was written in Forth. The timing had to be coded mathematically, which made "musical" feel and human timing difficult, and running a large number of machines nearly impossible.

360° PHOTO: BRIAN KANE; "TABLA" PHOTO: DOUG ADESKO

machinery into motion. The smaller Dog-Monkeys have made their way to the cradling arms of their giant, maternal counterpart. The tableau elicits a few anthropomorphically inspired "ahhs" from the audience, and the first half of the show has come full circle. The progression of sound and movement has controlled the focus and movements of the audience such that the formerly disparate worlds of machines and humans are now, both physically and emotionally, closely integrated. Within moments, the entire scene is again transformed. The sounds of the machines, and the machines themselves, are rushing through the audience and every key running every actuator is fair game.

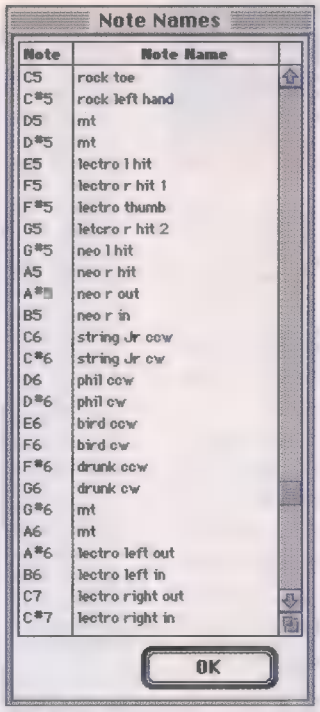

Fig. 1. *Opcode Vision lets you enter a custom name for each MIDI note; the names then show up in the piano-roll editing window (see Figure 3 on page 39). As Amorphic Robot Works' staff tweaked the sequences for live performance, this made it easy to see what effect ■ given note was supposed to have on a robot.*

What's MIDI to a Machine?

The Opcode Studio 4 MIDI interface is routing these programmed and improvised MIDI commands straight up the wall behind us, over the 50-foot high catwalks, and down the opposite wall via about 100 feet of home-made MIDI cable. The signals enter the custom-built "SBrain" controller on the other side of the room; out of it stream about three dozen runs of cable carrying the messages to the machines. These cables fan out across the floor and arrive at the actuators of the various machines through either single Sub-D9 connectors or terminal strips.

The larger 'bots have, on average, three or four pneumatic valves. One Sub-D9 is perfect in this case. Other lengths of 9-way cord end in terminal strips that fan out to the Kids, most of which are being run by one 12V motor and need only on/off switching. These can share a common ground at the strip. Four of the Kids, though, need bidirectional on/off switching for their motors. Their wiring takes up an entire strip and runs to the H-Bridge voltage-switching inputs.

Bird Girl (all the Kids have a descriptive prefix followed by a boy or girl suffix in their names), is one of the Kids who must have bidirectional motor control. She is made of 1/4" steel rod, stands about three feet tall, and scurries back and forth across the floor in a jumping-jack fashion. The direction of the motor determines the direction she travels. The floor at Muffathalle offers just enough traction for her long flat feet, and now she has scooted right into the audience and can go no further. Janette reaches across to the keys marked "bird" and turns her around.

The robots have, by now, managed to scatter the focus of the audience. There are over 40 machines going all out simultaneously, and no one notices the young engineer from Holland who keeps a cautious eye on his newborn creation. He is stationed all the way upstage to keep people away from the delicate cables, and to intervene in the event that the SBrain crashes on its maiden voyage. Wearing a black shirt and the Amorphic-issue black overalls, he vanishes as the first half of the show concludes with a blackout.

The "Down To The Wire" Tour Begins

Rewind just two weeks: Five of us have just flown in to meet Stock in Munich. It will be two weeks before we can unload the 40-foot sea-container that waits for us outside, two weeks before we even set foot onstage, but we're already in game face. The SBrain controller is not only in prototype, but in pieces. We've flown out with a thousand pounds of tools, cable, computers, and, most important, the 200 custom-made boards for the SBrain system. Within hours we're setting up shop in the Muffathalle basement. In typical Amorphic style, we work almost around the clock for the next ten days. Our soldering, cabling, and coding frenzy is inspired, in part, by gallons of programming fluid (Coca-Cola), several pounds of the San Francisco-based Peet's coffee, and the ever-present "Evil D" on the tape deck. What's the motivating factor behind this advanced study in sleep deprivation? If the controller works, we have a show. If it doesn't, the tour fails.

Fast forward to August 15th: Our show space in Muffathalle is finally clear, and at 8:00 A.M. we open the waiting container and begin hauling the robots into the space. We have only three days before opening night. Although the first show is billed as a "work in progress," we know that the press will be there and we need to do well in order for our producers to recoup the huge amount of money they've invested in us. The unloading half of the job is executed in under five hours. In order to set the robots in place, we have to work around the lighting crew. The electrics and other rigging take the better half of the evening and by 2:00 A.M. we're ready for a few hours of sleep.

The next day is not as easy. We have several electrical crises involving hydraulic motors that don't seem to care much for the European 3-phase power. One of them has

PHOTO: DOUG ADESKO

Musical Robots Attack Europe!

fried and the other one needs rewiring. It's Sunday and we have to wait until the following morning to even know if we will be able to run Too Big Dog Monkey or Mountain-Making Machine. Considering that the town is literally papered with large posters of Too Big, we desperately want that motor to work.

The electrical panic is tag-teamed by the light-focusing chores, which drag on much longer than expected. This leaves Brian and me in the dark — literally — as we wire the remaining machines. It's essential that we get the setup finished before we can run sequences and test the SBrain. Our dependence on the SBrain becomes complete when the "George Box," our small, backup controller box (named for its creator, George Homsy), gets shorted and fries. At 2:00 A.M. we call it a night and leave Brian to finish the wiring and start remapping notes in Vision (see Figure 1 on page 35).

Showtime

By early morning we're ready to run sequences. Brian has already configured OMS, the MIDI operating system used by Opcode programs (see Figure 2), and is running Max in the background. All sequences will be run in Studio Vision (the foreground application) and interpreted in Max through OMS's IACC (interactive communication channel) data bus.

We click on the "Best All Build" sequence and click on Vision's "piano roll" window to watch as the notes run by (see Figure 3 on page 39). Brian hits the Mac's "G" key and Tabla starts drumming. Soon the sequence runs through all of the percussive robots and builds to the full percussive ensemble playing at once. Soon, too, my several hours on the phone yield a new motor. With only a half hour left before we let in the audience, we manage a cue-to-cue rehearsal. Miraculously, we then manage to execute a nearly flawless show. (Visit the ARW Web site at www. sfo.com/~bk/amorphic to see QuickTime VR movies from the shows in Munich.)

This show was by far the most complex yet undertaken by ARW. The amount of organization, talent, and manpower it required was staggering. The software was more than able to meet its demands, however, and allowed us plenty of room for further experimentation and expansion. In Munich, we experimented with synchronizing the

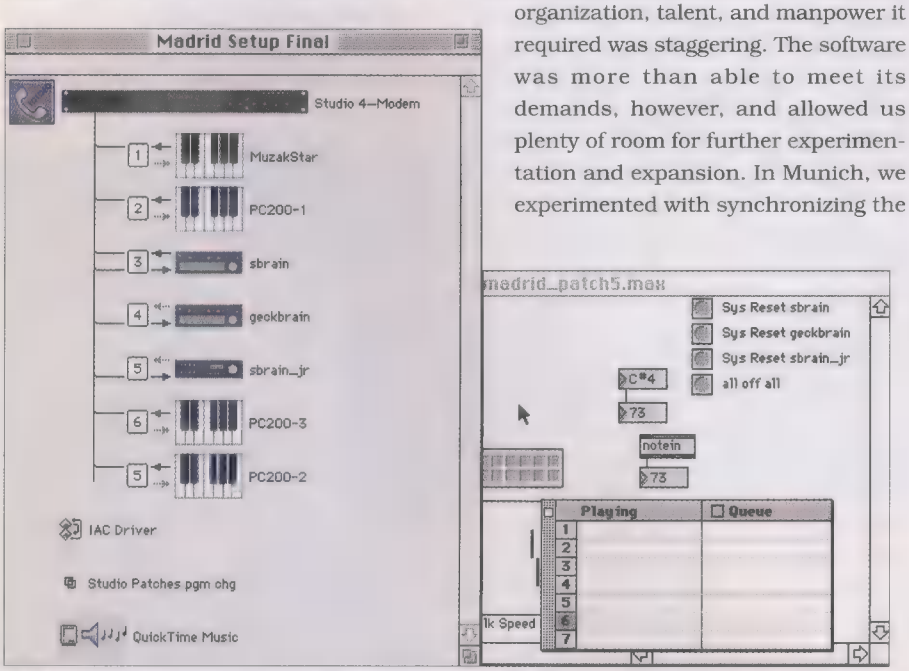

Fig. 2. *The OMS window at the left shows the MIDI routing employed in the performance. An Opcode Studio 4 MIDI interface is connected to the computer's modem port, and accepts input from four MIDI keyboards as well as the computer. Output is routed to three custom-built "brains" that convert the MIDI signals to voltages to run the robots. Data can also be directed to the Mac's QuickTime software synthesizer. In the background window, Max patch is processing MIDI data; OMS's IAC driver lets compatible programs share MIDI data in real time.*

Cast of Characters

Amorphic Robot Works is a group of San Francisco artists, engineers, and technicians who work under the artistic direction of Chico MacMurtrie to create robotic performances and installations. In 1992, ARW participated in Robots '92 in Japan and also staged performances in Holland and Denmark. In 1993, they exhibited *Primitive Behavioral Patterns* in Japan and presented *The Dog Monkey* in conjunction with Zaccho Dance Theatre at San Francisco's Theatre Artaud. They have staged additional performances in France, Mexico, Japan (for the Automata '94 exhibition), and at the Headlands Center for the Arts in Marin County, CA, which involved 45 individual robots.

ARW just returned from a tour of *The Amorphic Evolution*, its largest single production yet. The tour opened at The Lab in San Francisco in April '96 and made its way through the Muffathalle in Munich, Contained in Linz, Austria, Theatre Tacheles in Berlin, and Art Futura in Madrid, Spain.

The members are:

- Frank Aguillar — sound technician, servicing
- Jenna Diddier — technician, water design
- Tim Gubbins — technical director
- Brian Kane — computer programmer
- Chico MacMurtrie — artistic director
- Vicente Oropeza — technician, welder
- Mark Ruch — managing director, tour manager
- Mark Scheeff — mechanical engineering hardware
- Stock Plum — computer and hardware design
- Janette Wernegreen — sculptor, technician

Amorphic Robot Works' *Amorphic Evolution* tour was made possible through the generous contributions of the following corporations and non-profit organizations:

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Opcode Systems
Parker Hydraulic

show's lighting cues to the master sequences. Many lighting boards are equipped to respond to MIDI. Given a few additional days, we could have run the entire show with one keystroke from the Mac.

As we were the featured act of the opening rave for Art Futura, we decided to employ a touch of "house" sound by triggering a phat bass drum sample (via Apple's QuickTime Musical Instruments software synth). It was slightly askew of our artistic mission, but the audience was blown away. Brian wants, eventually, to set up a QuickTimeVR interface to run and program the robots by manipulating their images directly from a touch screen. Where does it end?

ARW's Web site features clickable virtual reality photos of the tour, technical information, and a recording of the robots in action.

He recently joked that we could run a factory with Max, or even drive a car: "Just take out the steering column. You'd free up half of the dashboard and leave lots of room for keypads and drink holders." The funniest thing about his statement is that it's actually possible. What's really impressive to me, though, is being able to do what you set out to do in a truly simple way. We ran our Ropeclimber robot up and down the seven-story marble stairwell of the Circulo de las Belles

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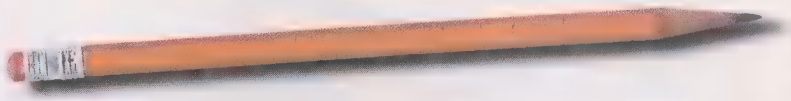

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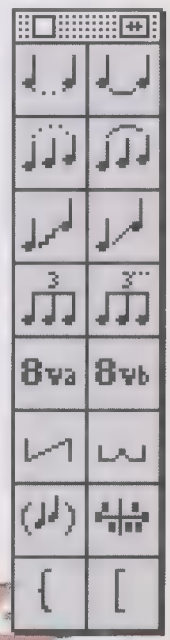

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READER SERVICE NO. 115

Musical Robots Attack Europe!

Artes in Madrid, for two nights, with a Vision sequence that used just three notes. We wrote a sequence to make him climb up and then retrograded it to make him climb down. It was stunning to watch, and frightfully simple to program (though downright scary to rig).

One night we had to add a last-minute machine only minutes before a show. It was for the Liquid Inseminating Device, which is a large cone that hangs from the overhead lighting truss and shoots green liquid goo onto the Mountain-Making Machine. It was a one-shot deal requiring only a simple 12V on/off command. What did we do? I had Chico touch two wires together at the appropriate moment. "It's a beautiful thing you're doing there," I murmered over the headsets. Beautifully simple.

Why "Amorphic"?

The word "amorphic" connotes to us the formless blob of primordial ooze from which all life evolved. We placed it before the word "robot" because the word robot carries with it so many preconceived meanings and images. I watched Chico creating the Tumbling Man many years ago. He rolled around on the ground for days and prototyped the movements using popsicle sticks and rubber bands. You're not likely to catch us designing a robot in Autocad.

"Every machine built is inspired or influenced by what I physically experience," remarks Chico. "The work is an ongoing endeavor to uncover the primacy of movement. We're not interested in 'high tech' necessarily. In the grand scheme of things, we're quite low tech. We wish, simply, to elicit an empathetic, emotional response from our audience through the use of mechanical sculpture. The pay-off for us comes when we see someone in the audience using body language to 'help' the Tumbling Man when he's struggling to somersault, or cheering when the Ropeclimber gets to the top of a hundred-foot rope, or laughing when the Drunk reels around in his continual temptation of gravity.

"The steel and aluminum we use to create forms is fluid. The computers can be programmed to do anything. ARW's robots are a metaphor for that which is most primary in the human experience — movement.

Tech Notes

At Amorphic Robot Works we use Opcode Studio Vision Pro for MIDI sequencing because of its ease of use, intuitive interface, "piano roll" editing window, and also because we run Opcode Max simultaneously. Max is used for creating specialized interpreter "patches," which can do things you cannot do in a standard MIDI sequencing program, like interpreting feedback signals and executing mathematical operations. Both programs utilize Opcode's OMS (Open Music System) MIDI operating system. [*Ed. Note: See the Fall '95 M&C for an introduction to OMS.*] We also use an Opcode Studio 4 multiport MIDI interface to route the MIDI data to the controller computers. You can also control machines through other flavors of sequencing software (Cakewalk, Steinberg Cubase, MOTU FreeStyle, etc.).

No matter what sequencer you use, you'll need special hardware that can convert the MIDI signals into something a simple actuator can understand. That's another matter, worthy of an article in itself. Here's how we achieved it:

The SBrain, named after its designer, Stock Plum, is a modular system. There are eight different boards that plug together in different configurations to accommodate different purposes. Each configuration has a Brainboard (the actual computer/MIDI interface board) as its core. For the reading pleasure of the hardened few, here are the specs of the Brainboard:

Processor: 12MHz Intel 8032
RAM: 256 bytes (0.25Kb)
Ports: serial; 32.5kbps, optically isolated 5-volt 440Ω current loop (the MIDI hardware spec, in other words)
Parallel: 1MHz, 8-bit multiplexed address/data bus (the Sbus)

The SBrain system controls a large number of machines simultaneously. Each MIDI note (0–127) on each MIDI channel (0–15) can be configured by inserting cards, much like a regular computer, to do one of three things. The note can be configured to simply turn something on and off, to turn something on at a certain speed, or to move something to a certain position. These functions can also be combined (*e.g.*, move this thing at this speed to this position). Thus, the SBrain is a device that converts MIDI commands into signals that can control our robots.

A word about our use of MIDI: We use just two commands for most operations — "Note-Off" and "Note-On." These two commands are three-byte data sequences. The first byte gives the command type (Note-On or -Off) and the channel number (0–15). The second byte specifies the note number (0–127) on that channel. In our implementation, a note corresponds to an actual actuator somewhere out there on the floor. The third byte is velocity (0–127), and we use that piece of data in three different ways.

Mark Scheeff, one of Amorphic's engineers, explains, "If the note is configured to control a simple on/off function, then any non-zero velocity will turn that actuator on. Sending a zero velocity will turn the actuator off. If the note is configured for a speed-control function, then velocity determines speed — 127 is full speed; 0 is stop. Finally, if the note is configured for position control, then velocity determines position. For instance, if this note controls an arm, then velocity 0 might place the arm hanging down at the robot's side and 127 would point the arm straight up. Send a value in the 60s, and the robot will extend its arm midway."

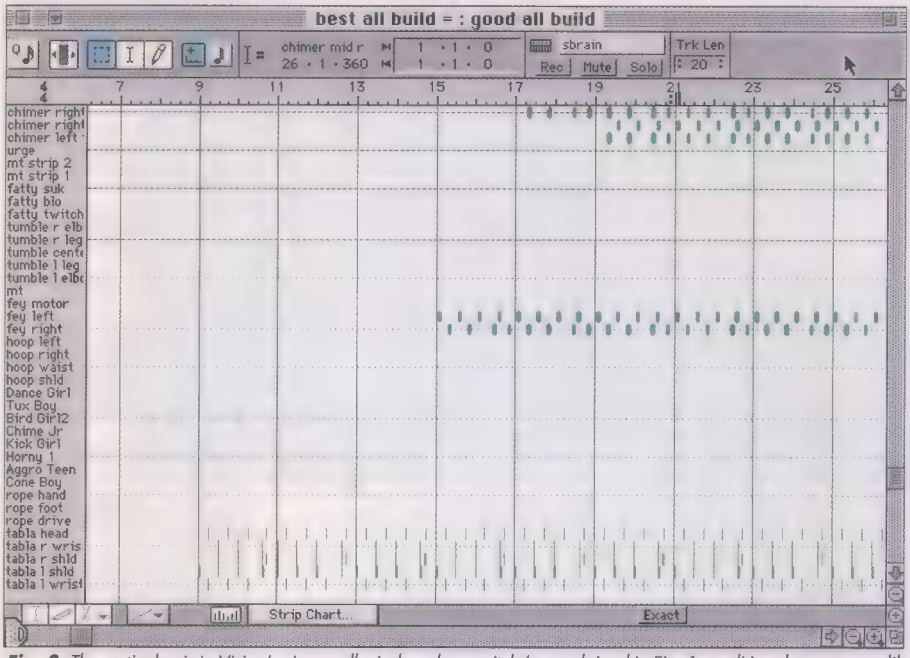

Fig. 3. *The vertical axis in Vision's piano-roll window shows pitch (as explained in Fig. 1, traditional note names like B♭ have been changed to indicate their function). The horizontal axis shows time in bar numbers. The green blobs represent notes, which here are used to trigger pistons and motors on the robots. Using musical time as a programming reference helps keep the performance musical.*

"Sounds move as well as forms. The music that the robots create is incidental to, and a part of, their interactions with each other and their environment. We try to create sequences that are unique to the players. We wouldn't want them to sound like a bunch of session musicians, but it takes a musician's skill to make them seem as if they're communicating. If their playing seems as if it occurs wholly of the robot's volition, then we've succeeded."

As I mentioned earlier, Amorphic Robot Works has company in the world of MIDI machine art. Stock, in fact, has designed controller hardware for *The Large Hot Pipe Organ* with Bastiaan Maris & George Homsy, *Multiple Machine Matrix* with Gordon Monahan, and *Research in/of Music and Artificial Intelligence* with John-Henry Nyenhuis. We share with them our interest in new technology and new approaches to creating sound with that technology. MIDI has had a huge impact on the work of ARW, but it will never replace the importance of sounds that are intrinsically interesting. Our tubes and the other struck and strummed objects sound cooler than ever, and though our performances aren't computer music as most people conceive of it, I believe they have everything to do with the process of using computers to push the creative boundaries and processes with which people make music.

PHOTO: DOUG ADESKO

Mark Ruch is a San Francisco-based musician/writer whose restless career has morphed from acting and directing in regional theaters to singing in rock bands to being the tour manager and managing director of Amorphic Robot Works. You can reach him at ruch@sirius.com.

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2	Spectrum	34	Lo-fi 2
3	Enhancer	35	Over Drive→ Chorus
4	Humanizer	36	Over Drive→ Flanger
5	Overdrive	37	Over Drive→ Delay
6	Distortion	38	Distortion→ Chorus
7	Phaser	39	Distortion→ Flanger
8	Auto Wah	40	Distortion→ Delay
9	Rotary	41	Enhancer→ Chorus
10	Stereo Flanger	42	Enhancer→ Flanger
11	Step Flanger	43	Enhancer→ Delay
12	Tremolo	44	Chorus→ Delay
13	Auto Pan	45	Flanger→ Delay
14	Compressor	46	Chorus→ Flanger
15	Limiter	47	Rotary Multi (OD-EQ-RT)
16	Hexa Chorus	48	Guitar Multi 1 (Cmp-OD-CF-Dly)
17	Tremolo Chorus	49	Guitar Multi 2 (Cmp-OD-EQ-CF)
18	Stereo Chorus	50	Guitar Multi 3 (Wah-OD-CF-Dly)
19	Space D	51	Clean Guitar Multi 1 (Cmp-EQ-CF-Dly)
20	3D Chorus	52	Clean Guitar Multi 2 (AW-EQ-CF-Dly)
21	Stereo Delay	53	Bass Multi (Cmp-OD-EQ-CF)
22	Modulation Delay	54	Rhodes Multi (EH-PH-CF-TP)
23	3 Tap Delay	55	Keyboard Multi (RM-EQ-PS-PH-Dly)
24	4 Tap Delay	56	Chorus/Delay
25	Time Control Delay	57	Flanger/Delay
26	Reverb	58	Chorus/Flanger
27	Gate Reverb	59	Overdrive 1/Overdrive 2
28	3D Delay	60	Overdrive/Rotary
29	2-Voice Pitch Shifter	61	Overdrive/Phaser
30	Feedback Pitch Shifter	62	Overdrive/Auto Wah
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READER SERVICE NO. 114

The Burn

So the bartender says, "Hey! That's not a duck." [Wait for laughter.] But seriously, folks, welcome to the final installment of the "Desktop to Disc" series, in which I, your humble narrator, produce an honest-to-goodness, ready-for-market CD in the privacy of my back bedroom as you gape in horror and amazement.

Astute readers of this four-part trilogy will note that we covered pre-production tasks, including setting up the studio, in the first article (Sept/Oct '96), sound design and basic composition in the second (Nov/Dec), and finishing compositional touches and mixdown in the third (Jan/Feb '97). In this article, we move from the desktop, finally, to the disc. That is, I'll take my motley assortment of tunes on DAT [digital audio tape] and, through the wonders of mastering, recast them as pockmarks in a mass-produced hunk

By Dave O'Neal

ILLUSTRATION: BOB BENNETT

of polycarbonate-coated aluminum to be titled *Erratica*.

A note about tailoring your production effort to the scope of your project: You can burn a CD for a variety of purposes, from making one to show your friends at parties to manufacturing millions to be marketed throughout the known universe. I'm aiming for the middle. I'll make a thousand copies that can be sold as a commercial product and played on radio without sounding like they came out of a home studio. Along the way, I'll burn a few for friends, but I'll stop short of cranking up the machinery required to turn my masterpiece into a platinum-selling album. That's beyond the scope of this article — unless, of course, you're a big record company executive, in which case I hope you'll be ever so kind and contact me in care of *M&C*.

You don't need $50,000 of equipment and a fancy studio to make a CD at home. This is the desktop where Dave composed, recorded, mixed, and mastered his disc.

Burning Sensations

When we last peeked into the back bedroom, I was tweaking mixes in Opcode's Studio Vision MIDI/audio sequencing software on a Macintosh Quadra 660 AV, recording the results to DAT, and listening through a variety of playback systems. The listening step is rather important to make sure your recordings sound professional.

How many DAT-equipped playback systems do I have access to? Not many, so I needed to find a more convenient way to complete Riffin' Dave's Recommended Quality Assurance Procedure. It had been a while since I bought new toys, so I headed out to my local gourmet bait-and-tackle shop to pick up a CD recorder.

I bought a Dynatek CDM-240, mostly because it's affordable and comes with Astarte's Toast CD-ROM Pro disc-formatting software. The Toast user's manual taught me a lot about what to look for in a disc recorder — things I didn't think about before I bought the drive, like *multisession* capability, *disc-at-once* and *track-at-once* recording, and the *drive cache*. Fortunately, the unit I bought supports the functions I need. (If you're looking to purchase a CD recorder, I strongly suggest checking out Astarte's Web page at www.astarte.de/.)

"Multisession" means you can burn a track or three, play with the disc for a while, and then burn more tracks (if there's space left). Unfortunately, you can only do this if you're recording a CD-ROM, not an audio CD, because the Red Book spec — the formal document that defines the precise data format required to make an audio CD — was published before the first implementation of multisession capability. Consequently, audio CD players see only audio data written during the first session.

Disc-at-once and track-at-once recording cut closer to the bone. When you're burning a CD, the writing laser (which is more powerful than the playback laser) alters tiny spots on the disc's dye layer, simulating the data pits on a pre-recorded CD. It takes a little time for the laser to turn on and off between tracks. In track-at-once mode, the machine burns one track, stops to figure out what to do next, and lays down 150 *run-out sectors* as it readies the laser to burn the next track. Disc-at-once mode lays down all your tunes as one big track, but the track is formatted with index pointers so there's no need for run-out sectors. This is definitely the way to go, because some older CD players read run-out sectors as irrecoverable disc errors. In addition, whereas track-at-once requires a specific amount of silence between each indexed track, disc-at-once is capable of

It had been a while since I bought new toys, so I headed out to my local gourmet bait-and-tackle shop to pick up a CD recorder.

running songs together and still indexing them properly. This seamless transition between songs is something I really wanted for *Erratica*.

The choice between disc-at-once and track-at-once may sound like a software issue rather than a hardware thing, but actually it's both. There are CD-R drives that don't support disc-at-once recording. I lucked out with my Dynatek. I didn't luck out with Toast CD-ROM Pro. Fortunately, Astarte makes an excellent pro version of their software, Toast CD-DA, that does support this capability plus a number of other features crucial to burning audio CDs for mass consumption.

We'll get to these in due course, but first, let's consider the *disc cache*. This is the buffer in which data is collected before it's needed to control the laser. Pretty simple, but if that buffer becomes empty while a burn is in progress, the result is an unreadable disc. Writing a CD is a continuous process — the laser keeps burning whether there's data or not. During one of my first attempts, the SCSI chain wasn't terminated properly, so a few data packets didn't make it and needed to be re-sent. The drive's 1Mb cache wasn't large enough to cover for the delay, and I made a coaster instead of a CD.

Toast is a very cool program and it supplements the drive cache with its own cache (which can be huge) on the host computer. However, a critical SCSI failure can prevent it from filling the drive's buffer, turning a disc into a doggie chew toy in a matter of six seconds (that is, 1Mb worth of data). Remember to terminate those SCSI chains, and it never hurts to sacrifice a few small animals to the great SCSI gods that keep the voodoo working.

Enough technomumble. Back to the music. The first task at hand is to transfer a good mix into the computer as an AIFF file. (Toast will also accept .WAV and Sound Designer II audio files.) Originally, I thought I'd be clever and pre-mix the MIDI-driven sounds to audio tracks in Studio Vision. This seemed the simplest way to mix, since I would avoid having to sync up the MIDI gear and all sounds would be balanced within the computer. ►

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READER SERVICE NO. 117

Naturally, theory didn't bear out in practice. My system just wasn't up to the job. Studio Vision works well with the limitations of the Quadra 660 AV and encodes audio input flawlessly on the hard drive. If it's shoveling a bunch of audio data down the bus when an interrupt comes in to send out a few more MIDI notes, the MIDI data waits. This delay is most likely to happen during recording, since recording requires more processor power than playback. It's nothing to worry about while you're composing or mixing. It just sounds like one of the musicians slacked off while the rest of the band played on, and the next playback is likely to sound just fine. But if you *record* MIDI notes that got put on hold, they become part of your production forever — something I wasn't willing to accept.

The MIDI problem prompted me to step back and look at the production as a whole, upon which it struck me with the force of a Marshall stack cranked up to 11 that there were more reasons not to record the MIDI tracks into the computer. For instance, the mix was already sounding the way I wanted it to. Why go out of my way to mess with it and risk screwing things up? And once the tracks were pre-mixed into the computer, the submix would be etched in audio. I would lose the opportunity to make minute adjustments of individual instruments as the final mix was going down. All in all, it seemed a lot more sensible to simply record the final mix to DAT and transfer it into the Mac.

So I recorded the good mix to DAT and recorded the DAT back into the Mac. Ahh, music to my ears — not the mix, but the whining of all you audiophiles about generation loss, extra digital/analog and analog/digital conversions, and crummy audio inputs on the Mac. Enough, already. Here's how I look at it: I may not have golden ears, but neither do most of the people who'll be buying my CD. If you're careful with levels and keep the cables short, this kind of stuff sounds fine. Honest.

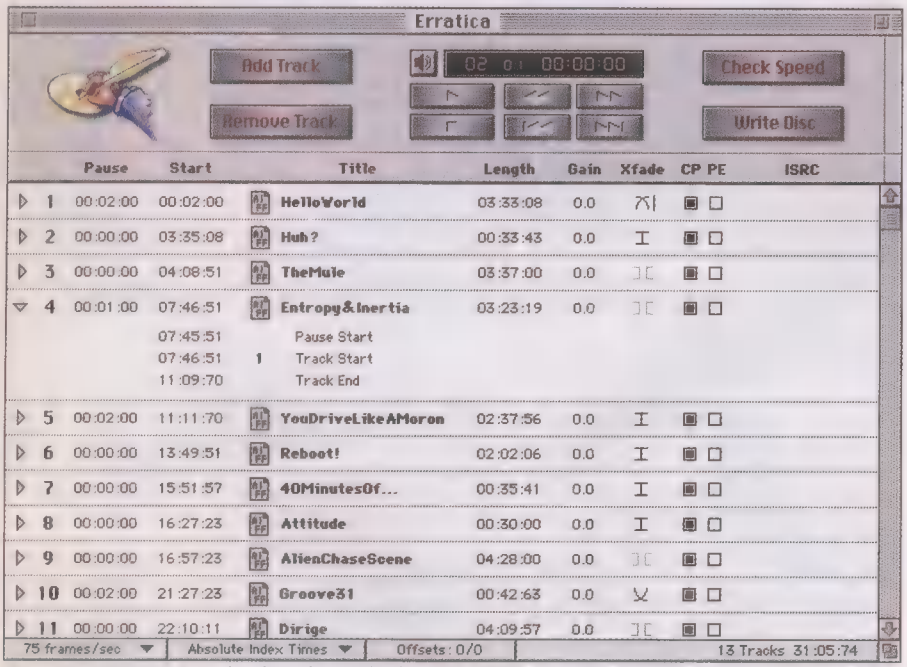

Fig. 1. Toast CD-DA's streamlined interface makes burning a CD fairly straightforward. When you drag audio files of the songs onto the window, the program automatically displays their lengths and start times in minutes, seconds, and frames. To add space between songs, you adjust the number in the Pause column. "Xfade" lets you overlap adjacent songs and perform a volume crossfade between them (you can specify the length of the fade in a pop-up window). The CP and PE checkboxes control whether copy-protect and pre-emphasis codes are placed in the track; Dave opted not to use the ISRC identification code.

Riding "The Mule"

The AIFF file is ready, so it's time to start burning. Toast CD-DA's simple user interface (see Figure 1) may make you wonder why it matters what audio CD formatting software you choose. Take a look at Ken Pohlman's book *Principles of Digital Audio* (second edition, SAMS Publishing, 1989). Chapter 12 details the intricacies of encoding, error checking, bit shuffling, re-encoding, and other formatting nightmares. With Toast, you don't even know they're there. Just drag and drop your AIFF files into a list, enter a little ancillary information called *subcode* data, and cook yourself up a CD. Easy as pie.

A few bits in each digital word on an audio CD are dedicated to carrying subcode information. This information includes the current running time within the current track, running time for the whole disc, track and index numbers, and a basic table of contents. Subcode data also indicates copy protection and pre-emphasis (a noise reduction technique seldom used today), Universal Product Code (UPC), and International Standard Recording Code (ISRC, which states the track's country of origin, owner, year of release, and serial number). The UPC is important if you want to sell your CD

The Toast manual taught me what to look for in a compact disc recorder — things I didn't think about before I bought the drive.

through mass distribution channels (see the "More than Just Music" section on page 48 for information on obtaining the codes). According to my contacts at Disc Makers, nobody really uses the ISRC anymore, so it's safe to blow it off.

Having fixed the music in a format that could be played on virtually every playback system on Earth, I proceeded to evaluate my work by calling on friends unexpectedly in the middle of the night and playing my still-warm CD through their stereos as loud as I could get away with. As it happened, in my haste to burn the CD, I put a bluesy redneck guitar thing (a radio station-type "concert calendar" segue) right after "Entropy and Inertia," my classically orchestrated groove tune. To my great dismay, the effect was like ketchup on sushi. After months of working on each song individually, hearing a project as a whole is a new experience. Some song-sequencing problems are subtle — something about the juxtaposition of the chords in two consecutive songs diminishes the effect of the second one — and others hit you right in the face, as this one did. In later versions, I separated the segue from the song, and the whole album seemed to like me better.

I ran into several more tangible problems. "The Mule" is one of my favorite tunes on the album, so I wanted it to shine. I thought the final mix captured a lot of what the song had to offer. But when I listened to it next to "Alien Chase Scene," it stuck out like a turd in a punchbowl. The latter song features a bunch of rumble combined with spacey ambient things that make you feel like you just pulled your head out of a washing machine's spin cycle, which made "The Mule" sound ridiculously tame in comparison.

Obviously, some sonic surgery was in order. It didn't seem right to simply duplicate the "Alien" rumble tracks and mix them in, so I tried to create a similarly deep ambience in a different way. I ran the entire song (at this point, an AIFF file on my hard drive) through the phase vocoder in SoundHack (a shareware program by Tom Erbe) and doubled the playback speed. Then I changed the sample rate from

During one of my first CD-recording attempts, the SCSI chain wasn't properly terminated, and I made a coaster instead of a CD.

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44kHz to 22kHz, dropping the pitch an octave while putting the song back in time with its original incarnation. Finally, I ran the deep version through Reverb (a shareware program from MIT) to give it a nice concert-hall ambience.

Back in Studio Vision, I layered my newly mutilated version of "The Mule" with the original tracks, thus giving the mix a new ambient character. The patient was still breathing, but some elements didn't quite survive the munging process, specifically the vocals and choir pads. In the end, I recorded a new version (mostly bass, drums, and tweezy Clavinet parts), munged it the same way, then put that back in the mix for a much better effect. It's more subtle than "Alien Chase Scene," but now they both sound like they were cast from the same hard drive, making the album more consistent.

"The Mule" finally had the sludgy sci-fi horror film sound I was shooting for, but listening to it next to "Hello World," it was nasal and dull. The solution? Equalize the whole mix. Lots of plug-in EQ software is available for various audio editing programs, each with its unique strengths and weaknesses. Dropped into BIAS Peak (my main audio editor), InVision's CyberSound FX plug-in was just what the doctor ordered. With "The Mule" onscreen, I set a parametric EQ module to slice out 3dB in the 200Hz to 400Hz range. This isn't the usual part of the spectrum for nasal sounds (unless your head is three feet in diameter), but after tweaking for a while around 800Hz, I realized the problem was lower down the spectrum. Then I boosted the range between 2.5kHz and 5kHz by about 4dB, adding enough high-frequency grit to kill the dullness, not to mention a couple of brain cells.

With the ambience and frequency weighting in check, this mule should kick, should it not? Well, yes, but something was still missing. I remembered reading something in the hacker's guide to noisemaking, *Music & Computers*, about the Waves L1 Ultramaximizer plug-in. Okay, so I wrote it — give me a break. Anyway, mastering is L1's forte. It's the kind of tool that separates the people who plink around in their basements from pros who know how

SoundHack analyzed the frequency content of the White Zombie tune and applied the results to my song. Wow!

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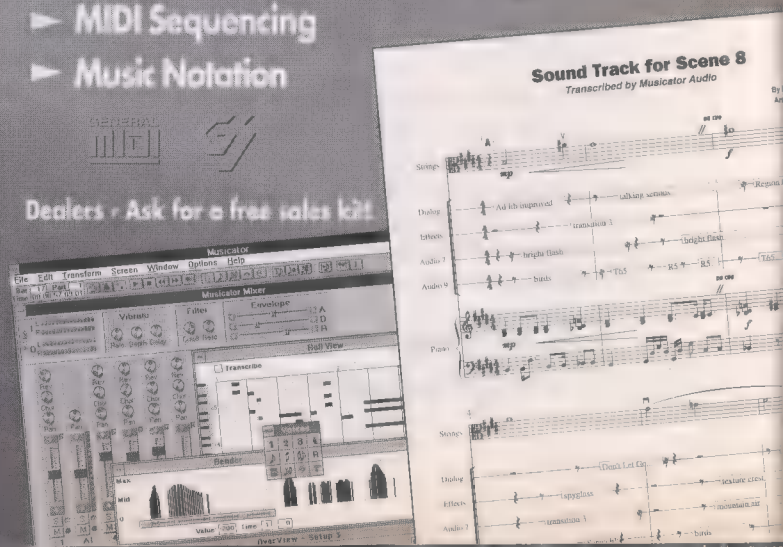

to fill your head with sound. It's really a simple concept, a look-ahead limiter that squashes a signal's dynamic range so the whole track can be turned up louder. The loud parts are still loud, but the quiet parts are louder than they were. The overall mix doesn't sound any different, just more energetic. In short, it kicks.

Check out my Web page (www.mindspring.com/~tml/erratica.html), where I've posted examples of "The Mule" before and after the tweaks I've just described.

While all this was taking place, I wandered down a path that didn't suit my purposes, but seems worth describing here. SoundHack has a spectral dynamics processor that divides a signal into separate frequency bands and compresses each band independently. Unfortunately, I wasn't able to make it do exactly what I wanted, mostly because I couldn't translate what I had in mind into numbers. This is the kind of tweak that requires a lot of practice and experience. Instead, I triggered the spectral dynamics processor using a short excerpt from a White Zombie record (which the original producers had totally limited and EQed for that soothing blow-your-head-to-smithereens sound). SoundHack analyzed the frequency content of the White Zombie tune and applied the results to "The Mule." Wow! The frequencies around the drum reverb were squashed to death, making them sound a lot more explosive and pushing the bassy noise thing out of the picture. It's not what I was trying to do, but it was well worth the detour for future reference. You'll find "before" and "after" files for this experiment on the Web page as well.

It may sound like I'm encouraging people to fry their audio files to death, but actually my best advice is to use DSP tools sparingly and let your ears be your guide. For instance, I ran "Hello World" through L1 and it just didn't work. I had recorded the guitar with some pretty heavy compression, and it was mixed to jump down your throat. Additional limiting just made it sound distorted and crunchy.

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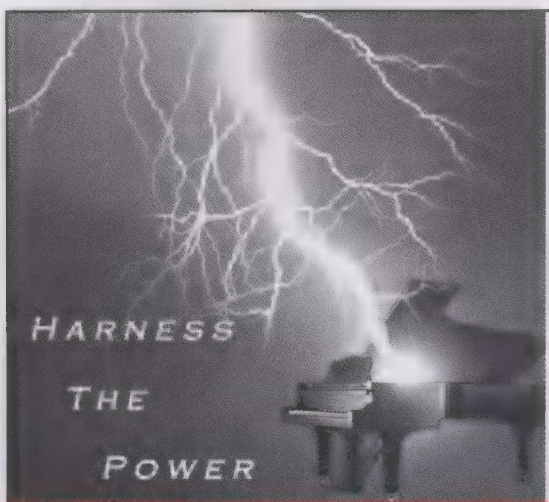

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advising you to squash your music's dynamic range. Why? Just because the CD can reproduce the music very well doesn't mean that the listening environment is forgiving. Most people listen to the radio in their cars, and quiet parts of a song can get lost in the road noise. I want people to hear all of my tunes, and I want my stuff to be played on the radio. Now for the less scientific answer: I write *loud* music. I have stylistically traded my dynamic range for a sonic effect not unlike an explosive shockwave. Just another tool to be used to shape your music the way you want it.

Mass-Production Mentality

With the whole album mastered, all that's left is to Toast up a CD like I did for the test burn, right? That'll work for the first few, but it's time-consuming and relatively expensive. Given the prices at most CD manufacturing houses, it makes a lot more sense to mass-produce if you're making more than 100 CDs. This takes into account only material costs, not the 20 to 30 minutes it takes to burn each CD individually, or the fact that recordable CD media aren't entirely reliable, so you really ought to test each disc you burn before you try to sell it. Still, owning a CD recorder with the proper software can save you a few hundred dollars on the cost of mass duplication.

While researching this article, I ran to my local Disc Makers plant and talked to the folks there about dealing with rogue cultural bombardiers like me who like to churn out albums in their home studios. They were very helpful, explaining how to prepare for a successful manufacturing run. It's a good idea to check out their Web page at www.discmakers.com. The site includes information about master tape preparation, answers to frequently asked questions, and templates for artwork to download. They even provide helpful tips for building contacts for distribution and sales. [*Ed. Note: Also be sure to visit www.cd-info.com, a wonderful source of CD-R information and links.*]

Disc Makers stresses listening to your master submission to make sure you like everything about it. Most problems, they say, result when their customers trust the engineer in the recording studio and don't bother to undertake a mastering session before sending the tape out for duplication. The first time they hear the finished product is when they receive a reference copy from the CD manufacturer. You can expect the manufacturer to make sure the recording fills a CD's entire dynamic range, but without a mastering phase during which compression, EQ, and the like is added, the result may sound quieter than you expected. Also, if stray clicks or false starts haven't been trimmed out, don't expect the manufacturer's engineers to clean them up without explicit instructions. If you don't tell them, they have no way of knowing you don't want stray noises to be left in.

It's helpful to list the contents of your master tape as thoroughly and precisely as possible, including track start and stop times and anything that needs to be fixed. If there's a click between two songs and you want it removed, note its exact location. If all the songs are separated by silence but you want particular cuts to butt up against one another on the final disc, tell the disc manufacturer not only the song titles, but their exact lengths and even what the audio is doing at that point (*e.g.*, "snare drum reverb fades to zero"). The better the documentation, the more likely you are to get what you expect.

Disc Makers formats their CDs using a Sonic Solutions system. They capture the master tape or home-burned CD digitally, convert the sample rate if necessary, make requested edits, then enter subcode data. Then they burn a CD just like the one you pulled out of your CD recorder, which goes to the customer for reference. If the reference isn't right, they do it again (and charge extra). Once the customer approves the reference disc, they make molded plates from it, stamp out the discs, and mail them to your doorstep within a couple of weeks.

Wait a minute — did I detect a duplicate step in there? I mean, you provide a finished, mastered CD and they recapture it and give it back to you as a reference disc! Assuming you have a cool piece of software like Toast CD-DA, you can bypass this step. The upside: You save a couple hundred bucks. The downside: You take a crucial step in the production process upon your own shoulders and eliminate one opportunity to catch errors before they cost you a lot more dough.

If you have any doubts about your ability to format a disc for commercial use, it may be cost-effective to use the manufacturer's mastering service. This service costs roughly $200 while Toast CD-DA costs about $500, so if you expect to make more than two CD titles, Toast and time spent becoming an experienced disc-mastering engineer are worthwhile investments. Having produced *Erratica*, I'm hooked on cranking out albums at home, so self-mastering has been well worth the expense to me.

More than Just Music

It's easy to forget that your final product is more than music. Without a package that features eye-grabbing artwork, your babies might just sit on a shelf. Most musicians have great ideas about packaging but lack experience turning a visual concept into a finished product. Most CD manufacturers are associated with graphic artists, either in-house or independent, who understand how colors translate from a computer screen into print, what screen resolutions work best with various printing processes, and other arcane matters. If you decide to use these services, again, document everything you want done as clearly as possible and exercise the patience necessary to answer questions thoroughly. The less guessing the graphic artist has to do, the better chance you'll get a package design that reflects your artistic sensibility.

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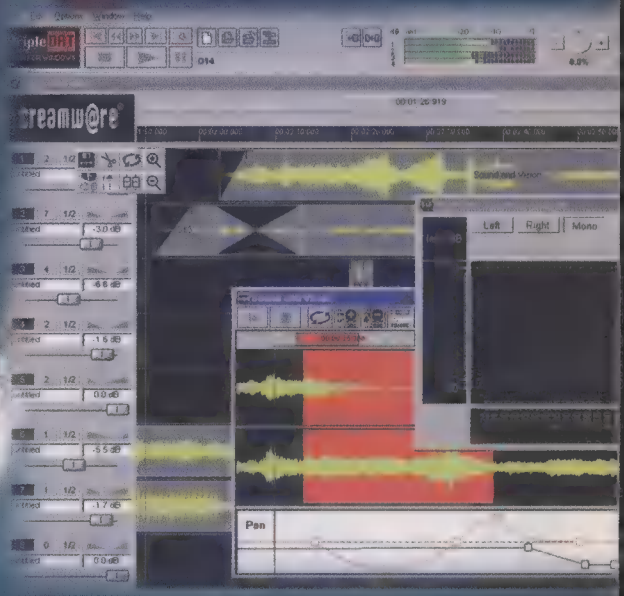

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That's a Duck!

So there you have it: How to make an appallingly ear-wrenching musical product at home in umpteen easy steps. I started by outlining the audio and MIDI munging features I would require and scaring up the hardware and software to fill these needs. Having packed the bedroom with whatever toys I could afford, I played around until the semi-random noises coagulated into a stream of aural juice that some might be willing to call music. Then I spliced, mixed, dovetailed, and smeared these ideas into complete songs, concentrating on creating a clean mix that emphasized the most critical aspects of each song. Finally, I laid the songs end to end and polished the entire album into a CD — fully mastered, formatted, and ready to send off for duplication.

It sounds so cut and dried, but actually it was chaos. All these processes happened at the same time. A new mix called for a different sound design, which changed the composition, which required that a new audio widget be integrated into the studio. But in a home studio, nobody's watching the clock. You can dabble to your heart's content and make sure the music is right. How well you juggle all these tasks without losing your creative focus is the true measure of success. It's not the number of expensive toys you manage to stack up in your bedroom that matters, but the quality of the noise that comes out the other end.

If you have any questions — most especially, questions about how to buy the *Erratica* album you've been reading about for all these many moons — feel free to e-mail me or call 800-867-7687 (408-739-7687 outside the U.S.). I hope this series has sparked a brush fire in your home studio. Good luck, and may you too make a hellacious, god-awful racket.

Dave O'Neal (e-mail: erratica@mindspring.com) plays and records with his band Industrial Soup and writes video game music and software for Electronic Arts. Stop by his Web page (www.mindspring.com/~tml/erratica.html) to hear behind-the-scenes excerpts from the CD.

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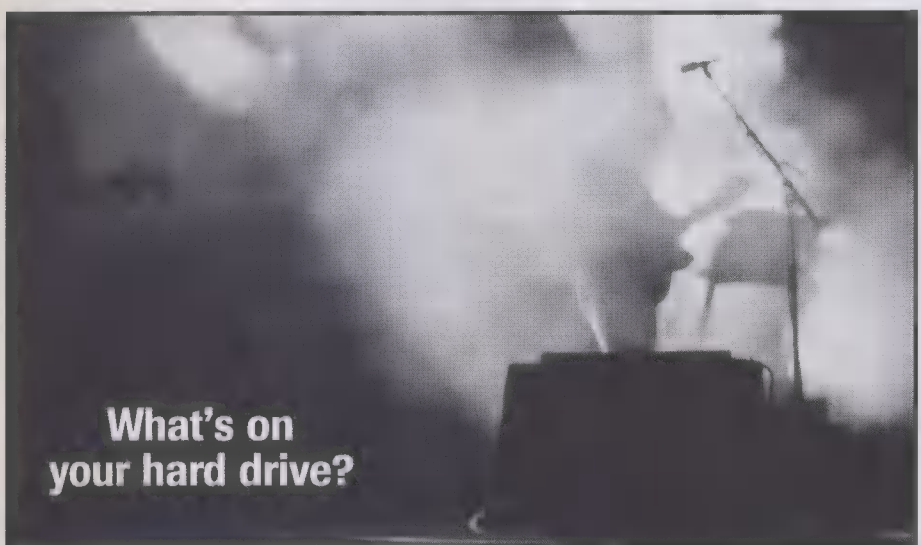

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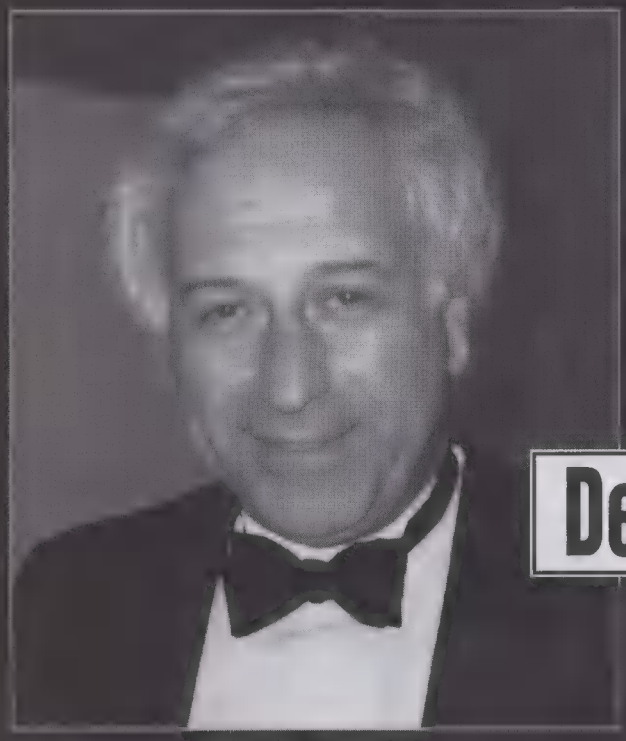

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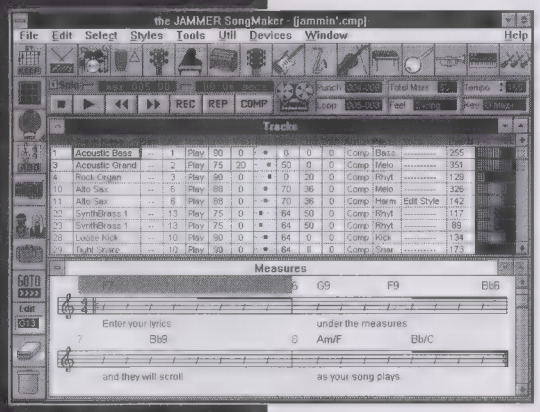

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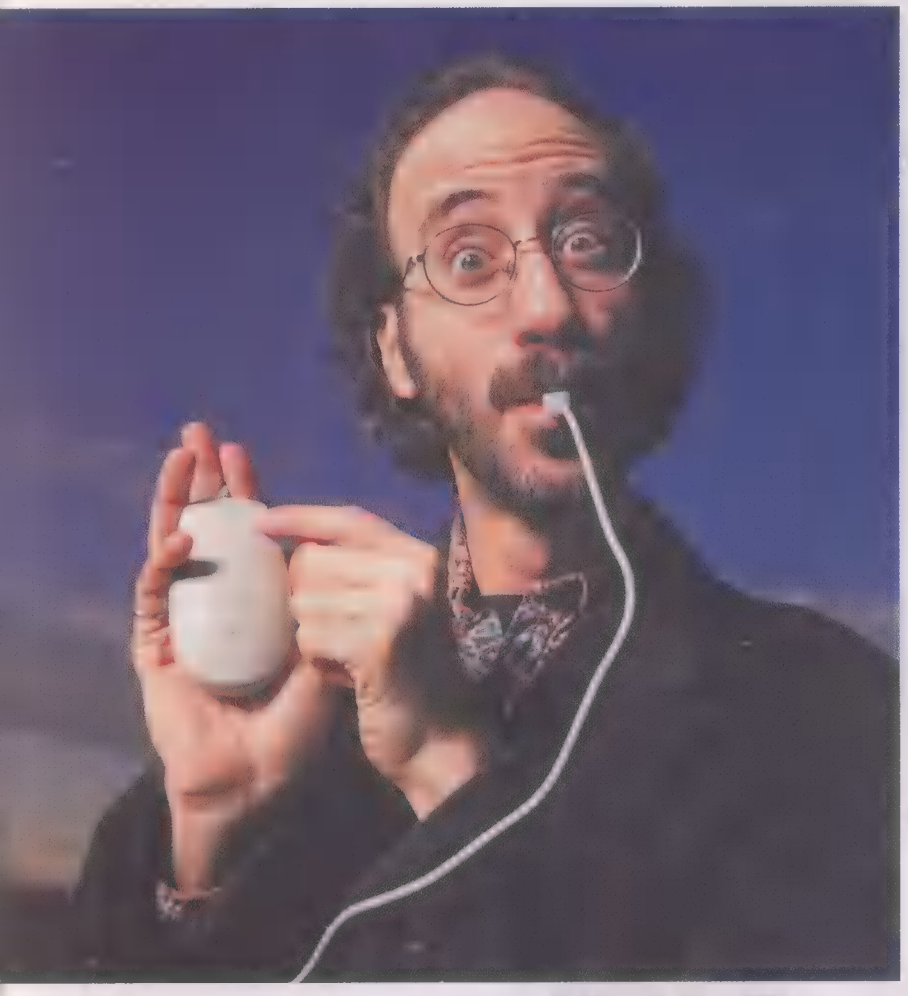

Life at the Bottom of the Dial

By David Battino

If you've spent any time around the 88MHz end of the FM dial, you've heard his music. National Public Radio's *Morning* and *Weekend Edition* and Public Radio International's *Marketplace* are all graced by BJ Leiderman's irresistibly catchy themes. And while he's often credited on the radio, you may not know that Leiderman has also won an Emmy for television sound design, composed commercial jingles for major clients like Eastern Airlines and General Electric, and co-written a rock opera.

For over a decade, he has made much of his music with computers. After several rounds of e-mail, we reached BJ by phone at his studio in Virginia Beach and launched into a rollicking conversation on music, computers, software, and writing music for hire. It was startling to find out that someone at his level was as frustrated by awkward music software and hardware as the rest of us. Probably more so — some of the most passionate moments of the interview came as BJ switched from speaking warmly about his musical associates to raging about how stupidly a particular software feature was implemented. As the tape rolled, he added some surprising tips on breaking into the advertising music business.

Your radio themes have an elegant simplicity. I wouldn't have suspected that computers had played such a big part in their production.

If it weren't for the Macintosh, I probably wouldn't be doing what I'm doing now. In

PHOTOGRAPHY: MARK ATKINSON

1984, when I saw the commercial for that cute little thing with "hello" written on it, I didn't know what it was, but I knew I had to have one.

I don't read or write music notation, and like so many other people, I've been able to do what we do through the integration of hardware and software. But the technology is just a tool — without a decent concept or musical idea, everything else is pretty much for naught. A photographer friend of mine once said, "You can't get a sharp picture from a fuzzy negative." But he wasn't talking about his picture taking. He was talking about a lot of the concepts and commercials he's worked on, where they had a lousy idea and expected the execution to pull it off somehow. No amount of technology is going to do that for you.

Can you walk us through the production of a spot?

I try to use my studio mostly as a demo tool, although these days the bang for the buck is so good that you can really get away with using it for the finished product. I've got the Mackie 24-channel [mixing] board, and I just bought a Roland A-90 [keyboard], which has a *wonderful* grand piano sound. I've had a problem with MIDI keyboards: They'll either have great piano sounds or a good keyboard feel, but not both. I'm pretty happy with both of these. I can take this keyboard out and actually play shows with it.

everything. But basically, the way I write is to start with piano. I'll do a scratch piano track or two, right into Studio Vision.

Recording it as MIDI or audio?

MIDI. I don't ever go to tape until I have to. At the last minute, I'll mix to DAT [digital audio tape]. If it's a session that I'm going to do all by myself here, I'll start from the ground up with the rhythm section. Since I'm a drummer, I have a [Kat] Drum Kat [MIDI percussion controller] and I play my drum parts in with it. I try to quantize minimally. I don't think I ever quantize piano parts or solos, just maybe a kick and a bass every once in a while.

Along the lines of what I was talking about before, if I'm not satisfied with what I hear with bass, drums, and piano, then I know no amount of icing on the cake is going to make it work. At that point, if I don't like it, I'll go back to square one. But if it survives up to that point, then I'll continue with brass parts or extra keyboard parts and percussion. I tend to go nuts on percussion.

If it's a session that I'm going to work with, say, [arranger] Jim Pugh on, I'll give him the song and let him go. I might suggest a string line or a brass part, but he *lives* that. NPR put us together, and I think that was the best moment in my musical career. I was pretty green at that time; I didn't know who was who. I'd point through the [control room] glass and say, "Who's that guy over there?" And he'd go, "Oh that's [trumpeter] Randy Brecker." "Oh my God. Who's that guy at the piano?" "That's Richard Tee." These were the guys he'd just *jam* with.

Do you give him a MIDI file?

No, I'll just give him a tape. We'll talk on the phone — a few thousand times — and then I'll come into the studio. Sometimes he'll send me a synth scratch track of what he's got going, just to see if he's not going off the deep end. But when he gets everybody together and counts to four, I'm in tears. It's just wonderful. I used to be very controlling about how I worked with other people, and then I realized, "That's no good, because I'm just trying to put my creative sound on this person. Why don't I just let them do what they do?" I've learned that when I do that, my stuff just flowers.

Writing music for hire must get frustrating sometimes.

The way advertising agencies and clients pick their music is so strange. It's so unlike how they go about picking most of the other stuff. Only in this side of it do they say, "Okay, we're going to let four or five different music houses write spec [free] demos and then we're going to pick among them." They don't say, "We're going to let four or five film directors direct spec versions of our commercial and see which one we like."

I don't think they're best served that way, but *they* think they are because they have all these choices. My point is, if you choose somebody you can put your trust in, know what he's done in the past, and let that person work with you through various incarnations of a piece of music until you get *exactly* what you want, then, well, you'd be getting exactly what you want.

Are you tempted to be more conservative, knowing you've only got one shot?

No, I'm not. They all say, "We want something wild, crazy, and different." They *all* say that. And then when they hear what I've got, they go, "*Aggh!*"

My dream is that the folks who came up with the Macintosh had come up with all this other gear.

I've got your regular midline stuff: Alesis D4 [MIDI drum module], and Korg O3R/W, [E-mu] Proteus, and [Roland] JV-1080 [MIDI sound modules]. I've got eight tracks of [Digidesign] Pro Tools [a hard disk recording system] tied to [Opcode] Studio Vision Pro [a MIDI/digital audio sequencer], and another eight tracks of TASCAM DA-88 [a digital audio tape recorder], which I rarely use. I've been spoiled by the computer-based digital audio. Oh, and a Kurzweil K2000RS [sampler/synth]. I don't have everything, and I certainly don't have the *best* of

I don't have a problem with being out there and original, because, frankly, I was never interested in being a "me too" type of guy. If you hit with something original, then you've *really* hit, because then everybody starts following you. Then again, it could all be just a fad. Who knows?

Do you hear your influence on other radio themes?

Well, in the *Fresh Air* theme on public radio, that whole [*sings last few bars*] sounds a little bit like the opening to *Weekend Edition*. If it's a "hats off," fine, and if it's accidental, fine too. Every time

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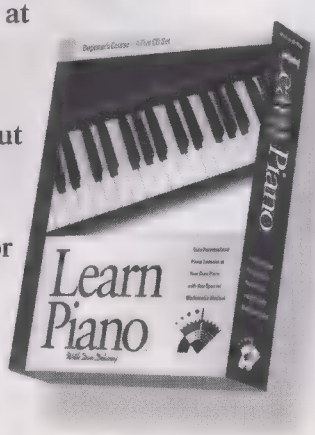

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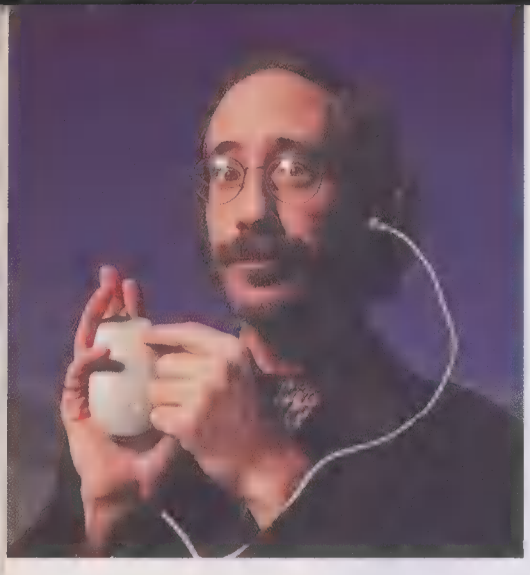

BJ Leiderman

I write something new, I live in mortal fear not only of ripping myself off but of being sued by somebody in Oshkosh. Maybe I *did* come up with something that sounds *exactly* like what the kid in Oshkosh wrote 12 years ago and has on a cassette somewhere. There are only so many notes to go around.

What's even stranger is that the ad agencies want you to sign a clause indemnifying them and their client against all claims, which I don't even do anymore. I don't sign those.

Do you worry about copyright infringement when you use samples?

You know, I *use* a sampler. I've yet to sample anything, so I don't worry about it. The reason I've yet to sample anything is because I've yet to get it together to learn how to sample something. My dream is that the folks who came up with the Macintosh had come up with all this other gear. Now I can still bitch about that, because the Mac is pretty complex now. I have a Power Mac sitting here. And when I see a dialog box come up that says something like, "Make sure that AppleTalk is off," I'm going, "No! *You* make sure that AppleTalk is off! Why do I have to make sure of anything? You should make my *breakfast* for me, knowing how much money I paid for you and what you can do. Why are you asking me to do a stupid little thing like go to the Chooser to find out if AppleTalk is off?" It's *idiotic.*

There are pluses and minuses to everything. Look at the Kurzweil K2000: It's a powerful piece of machinery, but I wouldn't call it user-friendly. I wish they had named all its functions really easy, stupid, like-a-six-year-old-could-understand-type names. The big brains chuckle at that — then we'd be able to understand all that stuff too.

Then there are programs like [Opcode] Galaxy [MIDI editor/librarian] that make it a *whole* lot easier to work with this rack-mounted gear. I hardly ever go to my rack anymore. I just change every sound through Galaxy. Except my beloved K2000, because somehow Galaxy and the K2000 aren't talking to each other. *I* don't know why. Yesterday, I found out from Opcode that there's a new revision of the Galaxy module, so I downloaded that. There's a little operation called "Get ROM Info" you have to go through before you can start transferring patches from the K2000 to Galaxy. And that has never worked, which brings me to the other point, which is, you call Opcode and, "Oh it's a problem with the Kurzweil." So you call Kurzweil and it's a problem with Opcode.

Guys, you *know* that most people out there are either working with Galaxy, Studio Vision, or Logic. There are a big three or four sequencer programs out there. It's *your* job. This stuff doesn't live in a vacuum.

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Have you ever gotten worthwhile help from the Net?

The Net has saved my life more than twice. There was a problem I was having with software installation. Oh, that's another thing! Anyway, I went up to a site — I think it was Opcode's site — and the FAQ there told me exactly what I needed to know. The rec.audio.pro newsgroup has saved me on a number of occasions. Ask them a question and the very next day I get 12 different answers, and one of them usually works. It's fabulous.

Unlike software installation.

Installers must tell me what they're installing where and why. None of this renegade guerrilla installation stuff, where I open up my System folder and there are 19 different things that I don't know what they do. They *must* give us a button that says, "De-install," that just takes everything out. I mean, it's *software.* It's software! It should know better than to leave two versions of something in the System folder.

How can someone get started writing jingles?

Here's something you can do in any community: If you see a TV spot out there that's either got a crummy jingle or needs some music, call the business and find out who their ad agency is. Then call the creative director of that ad agency and say, "Hey, I am such-and-such a company. I am new to the area—"

You present yourself as a company?

Sure! This is advertising. You've got to know how to advertise yourself. You don't tell them that you're 17 and you've just got an M1 [an old Korg synthesizer], 'cause they don't care. They just care about how it sounds. Actually, there are some clients who want to be wined and dined and sushi-ed at the best recording studio New York has to offer, but you don't need to start there, do you?

One of the niftiest ways to break into the business is to do a fake jingle.

You tell them that you've got some great ideas for their client, and you'd be willing to do the first go-around on spec. It's a cycle, because I'm sure you'll know some people in bands who are playing in clubs and would just love to break into this business. And some singers who'd like to strut their stuff and get paid some

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Hotbed of small waves and saltwater taffy — and Pat Robertson, bless his heart. Anyway, if the first one doesn't work, don't go back to school, go back to the drawing board. Keep that one on your reel and do another one. One of the niftiest ways, if you've really got some resources together, is to do a fake jingle. Pick a big

A lot of this business is more complicated than it really needs to be. A friend of mine in New York always used to say, "You know, these pieces of music are *so* overproduced. It's so unnecessary." And I didn't see what he meant back then. This is when I had just come to New York and I was just an eager little beaver.

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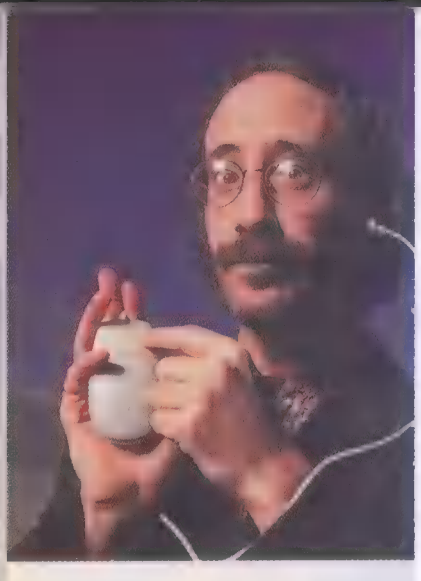

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You tell them that you've got some great ideas for their client, and you'd be willing to do the first go-around on spec. It's a cycle, because I'm sure you'll know some people in bands who are playing in clubs and would just love to break into this business. And some singers who'd like to strut their stuff and get paid some

One of the niftiest ways to break into the business is to do a fake jingle.

real money for it. You work a deal. They come in and do your demo for spec, because you're doing that demo for spec for the ad agency.

Find a recording studio. There are many around. If you're not lucky enough to have the bits and pieces in your living room, find a recording studio that's maybe doing bands and would love to supplement their income by opening their business to ad agencies. Tell them, "I'm the guy who's going to do that for you. Let me record this demo here on spec, and if they go for it and we get a budget, we'll come back here and we'll do it all again for real." That's how I started in Virginia Beach, Virginia.

Hotbed of jingles.

Hotbed of small waves and saltwater taffy — and Pat Robertson, bless his heart. Anyway, if the first one doesn't work, don't go back to school, go back to the drawing board. Keep that one on your reel and do another one. One of the niftiest ways, if you've really got some resources together, is to do a fake jingle. Pick a big name. Do it for Coke. You don't have to tell anybody it didn't run unless they ask you. A jingle for Coke is a jingle for Ford is a jingle for Honda.

Just copy a commercial off the TV and add your own soundtrack?

No, that's not even necessary. Just present them with the music. It works. You're really not presenting yourself as something you're not, because you wrote that jingle. If USAir asked you to write a jingle, you'd come up with that jingle or something just as good. You've proven to your prospective client, the ad agency, what you can do. And if you're able to save them some money in the interim, especially with local agencies, all power to you.

Pretty straightforward.

A lot of this business is more complicated than it really needs to be. A friend of mine in New York always used to say, "You know, these pieces of music are *so* overproduced. It's so unnecessary." And I didn't see what he meant back then. This is when I had just come to New York and I was just an eager little beaver. Everything was beautiful. Everything was wonderful. "What do you mean, 'overproduced?' This is great."

Now I know what he means. It's just a microcosm of the advertising business and even all entertainment. There's so much money thrown at this stuff, and it doesn't need to be. I wish a lot of this money were actually going somewhere else, frankly. And now that you can put a whole studio in your living room, some of that money *can* go somewhere else. [*Laughs.*] Now that they know you can do a jingle for $19.95, they want it for $19.95.

Can you run us through one more production you did?

How about a demo I put together in an hour? This was for Howard Hoffman, the guy I do a lot of the kids' stuff with. In fact, I'm working on the theme for a new Nickelodeon show called "Innie & Outie" for him right now. He was down here, trying to get a vacation from New York, and he had his guitar. I don't know what we were working on at the time, but he says, "Can you do a piece of music for this?" ►

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I said, "No, of course not," and immediately flipped the switch, turned everything on, and in front of his eyes, just started. I whipped out a piano part, a bass, a drum part, put a string part down, and then, to his delight, set up a mic and said, "You're playing guitar."

And we just played Beatles together. I let him play over and over again, and comped together a number of different takes on [Digidesign] Session 8 [a hard-disk recording system]. Within about an hour, we had a pretty righteous-sounding demo, with him doing guitar chords. And this is the most pleased client I've ever had, because he was on it. I don't know if I would have been able to do that ten years ago. That's an example of how the stuff really does open up possibilities for you.

What's next?

Well, I hope that between now and the next five years you'll be able to go to a store and pick up my first album, which will be entitled — I don't even have a contract yet, but I have a title — *Life at the Bottom of the Dial: BJ Leiderman and Radio Public*. I've been stifling my singer/songwriter career for all these years. I've played in bands, but, you know, cover-type bands, just for fun. You have to take a deep breath before you decide to go out and do something like this. First of all, I'm not the spring chicken I used to be, and most of the people buying the records now are spring chickens.

But you know, I was talking to someone the other day who said, "Your audience, BJ, they're back in the bars again. They're just divorced." Where'd my audience go? Well, they grew up, they got married, and they had kids. They stayed home. All of my friends who got married, I never saw again, until now.

Any more rants you want to bring up?

Don't let anybody tell you what's going to work, or what's a hit. I got this from William Goldman, the screenwriter who wrote *Butch Cassidy and the Sundance Kid*, among others. He said, "Don't let anybody tell you what's going to be a hit because nobody *knows* until it's out there. Just because something *was* a hit doesn't necessarily mean that the next thing that's written like that is going to be a hit. *Nobody knows.* If people knew what was going to be hits, then Dustin Hoffman would never be in a flop."

I don't care what kind of creative director you're dealing with, just look him right in the face and say, "Bullshit. You don't know. I don't know. I'm doing the best I can. This is what I feel. It comes from my heart. *Put it out there.*" This is what I love about the Internet and the whole technology thing — cutting out the middle man. Because whether you're in the advertising business, like I am, or in the singer/songwriter business trying to get your record contract, it's just a bunch of schmucks standing between you and your audience. It's just a bunch of obstacles. And one thing the music and computer technology are helping us do is remove some of those obstacles so there aren't quite so many hurdles we have to jump over to get our ideas from our hearts and souls to the people who want to listen to our music.

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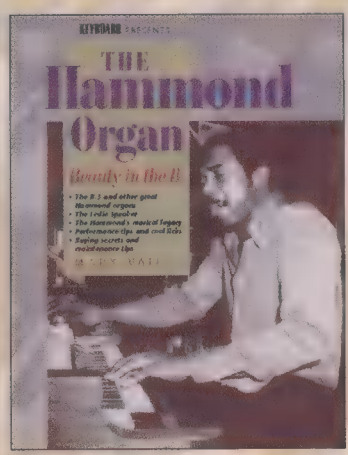

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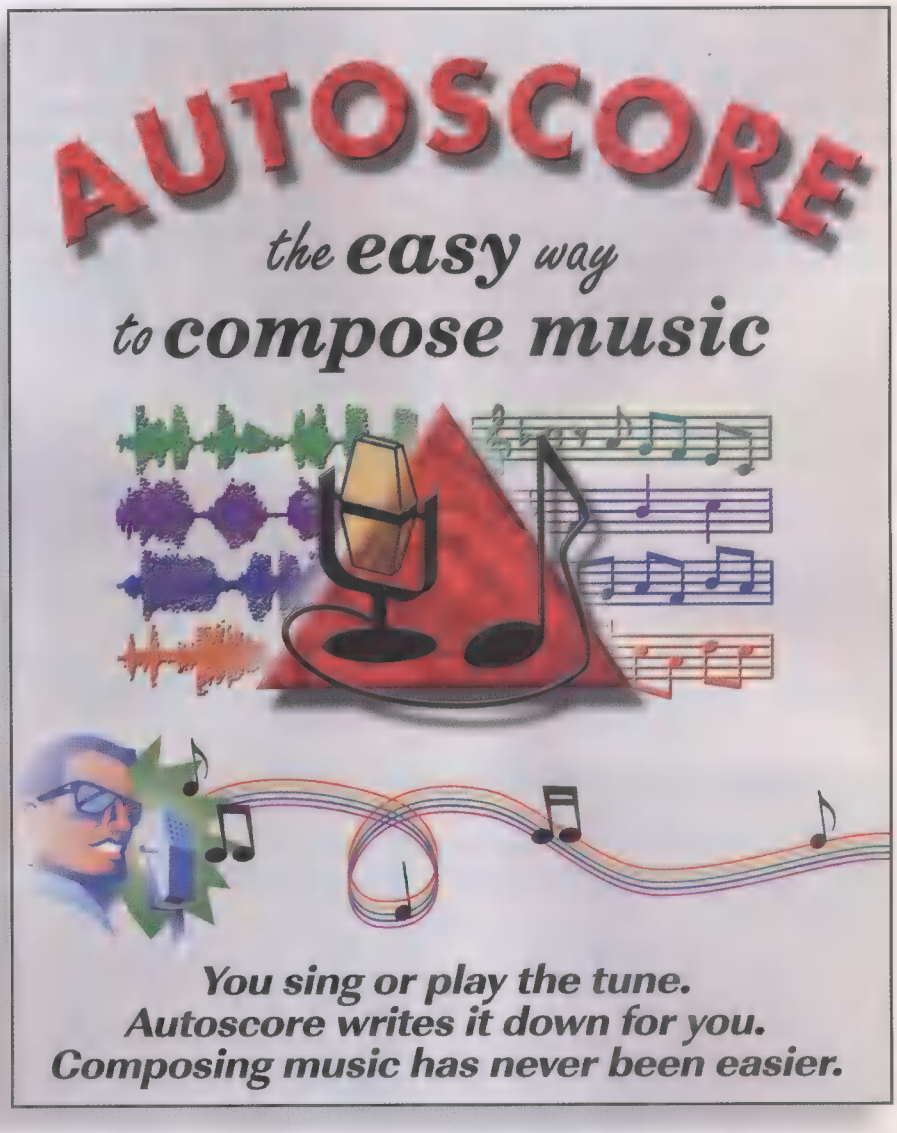
Pitch Recognition Software (MAC & PC)

By Ernie Rideout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Talk about your Holy Grails of music software development! Make music in front of your computer and it writes your performance down for you? Who wouldn't want a software program that would transcribe your singing or instrumental performance? And how about a program that works with music software that you may already have? Sounds mighty good, doesn't it?

The folks at Wildcat Canyon Software hope you say "yes" to that last question. They've designed Autoscore to perform the feats mentioned above as transparently as possible, so that musical novices can get some of the benefits of music notation and sequencing software without needing keyboard skills or much experience with MIDI equipment. Autoscore is a small software program (almost a utility, really) that works with many popular host programs to give them the ability to transcribe monophonic (one note at a time) audio input into MIDI data. It also works as a stand-alone application that saves transcribed input as MIDI files, which can then be imported into any sequencing or music notation program. In essence, Autoscore promises to take your monophonic instrumental or vocal performance and turn it into something a host music notation program or sequencer can use. It even comes with a perfectly serviceable microphone that you can hook up to a soundcard or to your computer's mic input.

Open to Interpretation. What seems like a simple task, however, involves some serious interpretation on the part of your computer and the software. The first problem is getting the software to understand what tempo and rhythm you have in mind when you perform. You can't just sing freely into the microphone; you must first tell the software what tempo and meter (*i.e.*, time signature: 4/4, 3/4, etc.) you want. As you record your performance into the software, you must listen to a metronome click provided by the software, preferably through headphones so as not to interfere with the interpretation of your performance. You must adhere to the tempo rigidly, and place your rhythms accurately and deliberately. Otherwise, the host program will notate your rhythm according to its own interpretation regardless of how you thought you performed it.

The second problem is with pitch. As with tempo, you and the software must first agree on the overall pitch of your performance,

Wildcat Canyon Autoscore

whether at the standard pitch of A=440Hz, or some other pitch standard. Your performance must then maintain accurate tuning within a particular key, or within the chromatic scale. If you want Autoscore to follow your microtonal (*i.e.*, between the notes of the piano) performance, it can do so; notation programs will still interpret such input as being a particular chromatic pitch, while sequencing programs will record and play back such input as notes with added Pitch-Bend information. This is less of a problem with instrumental performances than with vocal, but in any case, it is not a trivial concern.

Scoring Big. Now that we've established our responsibilities as users, let's take a closer look at how Autoscore works with host programs (for a list of compatible programs, see box at right). Once installed, Autoscore appears as a menu item in the host program (see Figure 1); the menu name indicates whether Autoscore is currently active or not. To use it, simply select "on" from the menu, and put the host program in record mode, just as if you were recording from a MIDI keyboard; then sing or play a clarinet, flute, trumpet, guitar, or any instrument you choose. When you've finished recording, you can use your host program's transcription features to turn the input into notation, or simply use it as a track of a sequence. Autoscore itself provides no editing power; that's all up to your host program (see the "Lift Ev'ry Voice" sidebar on page 62).

I used Autoscore with a number of host programs. On a PowerPC Mac, I used it with Musicware's Nightingale (a music notation program), Jump! Software's Concertware (sequencing and notation), and OSC's Metro (sequencer). On a Pentium PC, I ran Autoscore with Midisoft's Studio (sequencer), Cakewalk (sequencer with notation), and Passport's music@passport (a notation program with Autoscore built in).

While the results varied from program to program, the configuration process was challenging in all cases, especially on the PC. The first hurdle is to get the audio input from your microphone into the computer, and then from the computer to the software. On a PC, this normally requires the use of a soundcard such as a Sound

Fig. 1. *When used with a host program, Autoscore appears innocuously as a final item on the menu bar.*

MUSIC@PASSPORT
FILE EDIT NOTES MEASURES SCORE VIEW WINDOWS SETUP PITCHWRITE HELP
Notes
MICROPHONE ANALYZER
Pitch Meter
Level Meter
Instructions
To test your setup:
1. Say "Passport" into your microphone. The Level Meter should go at least into the Normal (yellow) range.
2. Sit back and be quiet. The Level Meter should be off or at most in the Background (blue) range.
3. Sing or play your instrument into the microphone. On your loudest notes, the Level Meter should go well into the Loud (red) range. The Pitch Meter should track your music evenly without jumping all over the staff.
4. Turn off or disconnect your microphone and click the Test Feedback button. As you hear a series of test notes being played, the Level Meter should be off or at most in the Background (blue) range. If you don't hear the test notes, quit all MIDI programs and test again.
Over-drive
Loud Sounds
Normal Sounds
Quiet Sounds
Normal Background Noise
D#2
Note: If your system does not pass all four tests in the Instructions section, see your Help file for a list of problems and possible solutions.
Test Feedback
Info...
About
OK

Fig. 2. *On the PC version, Autoscore provides this colorful meter with which to run your microphone tests.*

DESCRIPTION
Audio pitch-recognition software.

HARDWARE & SOFTWARE REQUIREMENTS
IBM-compatible PC: Windows 3.1 or 95. 386 CPU with 4Mb RAM minimum, 486 with 8Mb recommended. Windows-compatible soundcard. Macintosh: 68020 or better CPU, System 6.0.7 or later. Macs without built-in sound input require Macromedia MacRecorder or a Digidesign soundcard.

COMPATIBLE SOFTWARE PROGRAMS
PC: Cakewalk (all versions), Passport MusicTime and Encore, Coda Finale, Midisoft Studio (all versions). Macintosh: Coda Finale and Allegro, Jump! Concertware, Ars Nova Practica Musica and Songworks, OSC Metro, Musicware Nightingale, Opcode Vision (pre-v. 2.0) and Musicshop.

FEATURES
Microphone included. Integrates with host programs, or can be run with a standalone program (Autofile, supplied) that saves converted input as MIDI files. Recognizes male and female voices, violin, cello, guitar, bass guitar, and high, medium, and low winds. Can be configured to recognize particular instruments and vocal ranges. Interprets input in a particular key, chromatically, and/or with pitch-bend tracking. Plays "test tone" arpeggios in the selected key to orient singers.

COPY PROTECTION
None.

SUGGESTED RETAIL PRICE
$150.

CONTACT
Wildcat Canyon Software, 1563 Solano Ave., #264, Berkeley, CA 94707. 510-527-5155; fax: 510-527-8425; Web: www.wildcat.com.

PROS
Nicely integrated with host programs. Easy to learn to use. Follows pitch accurately.

CONS
Results may vary depending on your host program and soundcard. Configuring your system may be troublesome.

BOTTOM LINE
When it works, it works pretty well, but optimizing your system and your input abilities may be a challenge.

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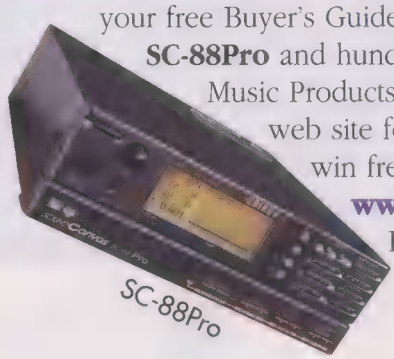

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Blaster, although some newer machines have a built-in mic input. Frankly, I had a heck of a time getting input via soundcards, even after verifying that all the appropriate drivers had been installed and were active. Admittedly, one machine I used had two soundcards installed, which is generally a recipe for bad results. Ultimately, I got the best results using the built-in mic input on the PCs.

On the Mac, Autoscore uses MIDI Manager's Patchbay utility to configure its path to the host program. Though Patchbay established a solid connection with all the hosts, it seemed to cause system crashes when I used it with two of the programs. Again, this may have something to do with my own system configuration; nonetheless, the situation did not inspire confidence.

Once you have the mic working, Autoscore gives you a test procedure to determine background noise level and signal level (see Figure 2 on page 60). The next configuration is to determine your input source: Autoscore provides several preset instrument and vocal settings, as you can see in the Spec Box on page 60. You can alter these settings to better match the range, dynamics, and note lengths you'll be performing.

You can also ask Autoscore to force your input into a particular key, or to the chromatic scale. If you're working with a sequencing program, you can ask it to track your volume, glissandi (slides), and vibrato as well; you'll hear the results when you play it back on your sound module: Variations in input volume are translated into MIDI volume, and variations in pitch to Pitch-Bend.

Lift Ev'ry Voice

Possibly the most useful application of Autoscore is for those who can read music and have musical ideas, but whose instrumental skills are impaired. For example, I'd wager that a good many of you are excellent singers, and that some of you are involved with groups that use musical arrangements, either instrumental or vocal. True, you can always jot down your score on a sheet of manuscript paper. But if you can't play your way out of a paper bag on a keyboard, then you're going to have to wait until next Tuesday's rehearsal to hear what you've written, warts and all. On the other hand, with your computer, a copy of Autoscore, the right host program, and a MIDI module, you've got a system that'll let you sing in your parts, edit the score, and hear the results before you commit your work to your printer.

"Hold on, there," you ought to say at this point. "Sing in an entire score? One person can't sing all those parts from soprano to bass." Astute observation, and as one of the hordes of pseudo-baritones who can't sing out of the staff in either direction, I know the limitation all too well. The beauty of a decent notation program is that you can sing a part in whatever octave (or portion of an octave) you can manage, and then transpose the transcribed part to the correct pitch.

Here's how I created a score fragment using Musicware's Nightingale notation program for the Mac. First, I set up the score in the standard soprano, alto, tenor, bass (SATB) configuration. I set a metronome click to a reasonable tempo, and listened to it through headphones so I wouldn't screw up Autoscore. I put the program into record mode, and sang the bass part on a "da" syllable, paying careful attention to my pitch and time. As it happens, it came out perfectly on the first take (see Figure 4). Then I selected the tenor staff and recorded the tenor part, which you see in Figure 4 in octave treble clef, and which is written an octave higher than it sounds. As I sang the tenor part, I listened to the bass part being played on a vocal patch on a Roland Sound Canvas synthesizer module. I had to extend the duration of the *F#* in the second bar to make it into a whole-note; either Autoscore or Nightingale interpreted my input as a dotted half-note.

So far, so good. I then recorded the alto and soprano parts by singing the notes I wanted an octave lower, and the result is Figure 5. I had to futz with note durations a bit with both parts; perhaps my vocal volume dipped below Autoscore's current threshold, which I had experimented with quite a bit already to get results this good.

Once I had the durations correct, I selected the alto and soprano parts and transposed them up an octave (see Figure 6). Presto! My score complete, I had Nightingale play through it a couple of times to make sure I had written what I had in mind.

What's the advantage of creating a score this way rather than by entering the notes with the computer keyboard or mouse? Well, if you conceive of music by singing, or by playing a non-keyboard instrument, the Autoscore method makes the process more like multitrack recording than score preparation; perhaps this will make the process of composition a bit more accessible to you.

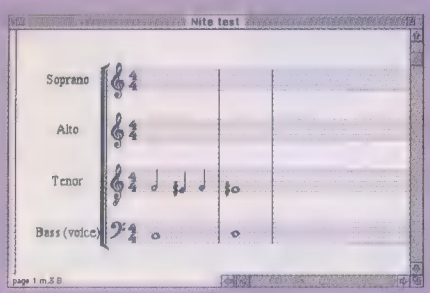

Fig. 4.
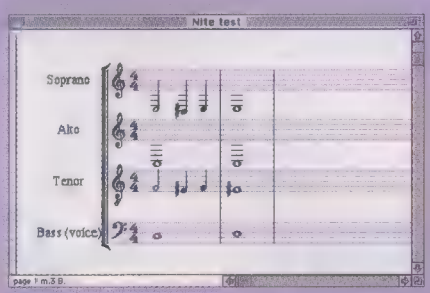
Fig. 5.

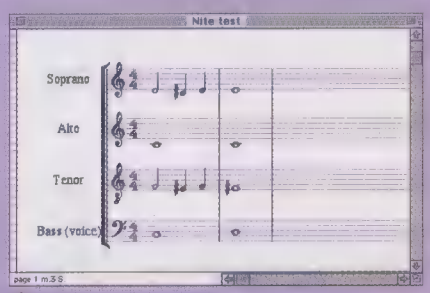

Fig. 6.

I obtained the best host program results with music@passport and Nightingale. Their transcriptions generally resembled my input (I'm a conservatory-trained guy, and I know the input was adequate), although there were often errors in note length or even pitch, where half-step movement was concerned. Rhythmically, the transcriptions were as accurate as with direct MIDI input, which is to say it was good with both programs. It's no coincidence, though, that both programs have excellent MIDI transcription abilities in general, with the ability to distinguish between dotted-eighth-sixteenth figures and triplets.

The other programs interpreted my input as a series of chopped, random rhythms, turning whole-notes into syncopated sixteenth- note figures and providing many falsely triggered pitches. Even with considerable tweaking, I got no usable results using these programs as hosts for Autoscore. This may be no fault of the programs themselves, however.

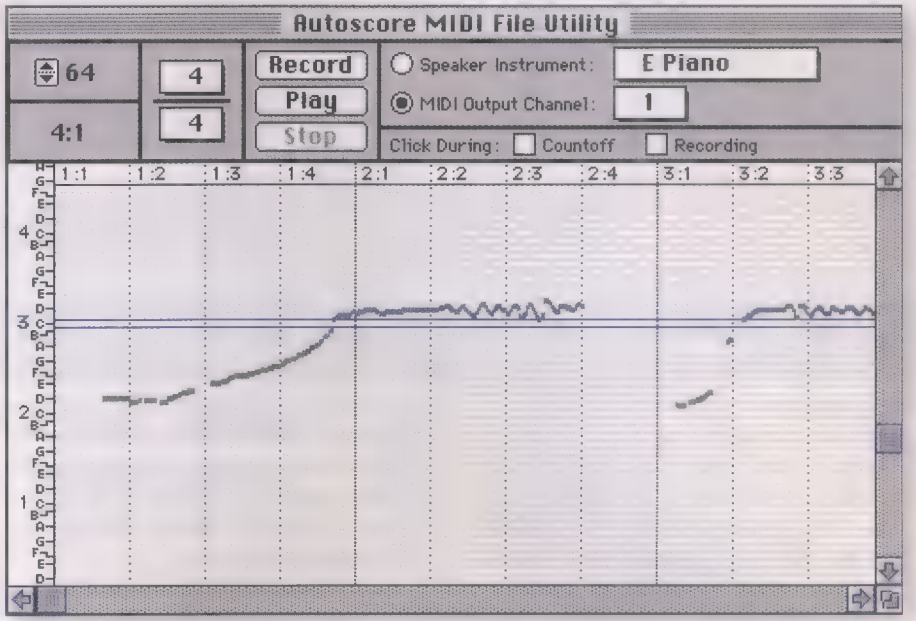

Fig. 3. Autofile's piano-roll window shows the results of recording a vocal performance with significant glissandi (long pitch slides) and vibrato: It tracked like a bloodhound.

Though Wildcat Canyon lists them as compatible host programs, there is considerable variation from one version of a program to another, and it may simply be that the versions I used have yet to be included in an Autoscore revision. Wildcat Canyon indicates that they are constantly revising to accommodate more

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release versions of the same programs. Indeed, Autoscore's Version 2 is slated for release soon after you read this.

The true test of Autoscore, and in my opinion its most effective application, is in its stand-alone configuration, which is called Autofile (see Figure 3 on page 63). Even though it involves an extra step compared to using it with a host program, Autofile provides enough tempo and meter control to enable accurate performance. I got solid results with all the instruments I tried: violin, flute, recorder, trumpet, trombone, acoustic guitar, and my own voice. With pitch-bend tracking enabled, Autofile captured glissandi and vibrato quite accurately. You can save an Autofile recording as a MIDI file, which you can then import into any sequencer with excellent results. Although I had to do it one track at a time, I built up a sequence of wind parts that sounded very convincing when played back on my Roland Sound Canvas (with its pitch-bend set wide to accommodate the vibrato and slides I threw in). I had similar luck with more by-the-book Autofile performances that I imported into a variety of notation programs.

The Final Score. Autoscore works pretty darn well, especially by itself as Autofile. Currently, Autofile allows you to record only one monophonic passage at a time; subsequent passes will erase previous material. According to Wildcat Canyon, version 2 will offer "enhanced" performance, as well as its own multitrack sequencer, which will let you compose multiple-part music without the use of a host program. Welcome additions indeed.

If you want to use it in a host situation, contact Wildcat Canyon to get the latest information about what programs and versions are fully supported; if your host is on the list, go for it. If not, consider buying one that is. If the host program has excellent MIDI transcription performance, your results are likely to be better than with programs with poor performance. Depending on your platform and the age of your computer, you should expect some difficulties getting the system up and running.

For the keyboard-shy among you, Autoscore may provide a more comfortable MIDI environment in which you can sequence and compose. You'll have to spend as much time correcting your score as a person who plays keyboard fairly well, though, so it won't necessarily speed things up for you. It will give you all of the subsequent editing and printing power that word processors bring to the writing process. Be warned, though, that your instrumental or vocal performance must be first-rate in terms of pitch and rhythm accuracy for the program to work; Autoscore cannot improve your abilities.

Multi-instrumentalist Ernie Rideout is an assistant editor at Keyboard.

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Tone Module Tips for MIDI Guitar

By Craig Anderton

In the year since Craig Anderton's groundbreaking Mar/Apr '96 cover story on integrating guitars and computers, we've received many letters from readers wanting to know more about MIDI guitar. Because one of the more confusing aspects of setting up a system is configuring the synthesizer tone module that produces the sound, we asked Craig to expand on that process this month. —Editor

Whether your MIDI guitar tracks well or produces noises more commonly associated with rush hour on the Long Island Expressway may have less to do with your guitar converter than how your sound generator is set up.

Some sound modules are designed specifically to work with MIDI guitar as well as keyboards, some aren't designed for MIDI guitar but will work satisfactorily, and some simply will not give good results, no matter what you do. The reason for much of this lies in the synth's *MIDI mode* options. The choice of MIDI mode determines how the synth will respond to incoming MIDI messages.

Back to Mono

When MIDI was first defined, the standard reception modes included Omni, Poly, and Mono. In Omni mode, an instrument responds to Note data on

ILLUSTRATION: RICK SEALOCK

any of the 16 channels, but plays the same sound program no matter what channel the data is on. In other words, the channel designation is ignored. In Poly mode, a synth will respond to only one MIDI channel, and will do so *polyphonically*. That is, you can play chords, although all notes will play back with the same sound program. In Mono mode, the synth will respond to Note messages on any of the 16 channels, and each channel can be assigned a different sound — but only one note at a time can be played on any given channel. One reason Mono mode was developed was to accommodate MIDI guitar, since a guitar is essentially a six-channel instrument that plays one note per channel.

However, MIDI guitar never became a big deal, although multitimbral synths (which can play different sounds simultaneously and polyphonically) did. As a result, Mono mode mutated into a multitimbral variation (called Multi mode) in which individual sounds could respond polyphonically on each channel. While this was great for multitimbral synth work, enabling each channel to play chords with a different sound, it was not great for guitar synthesis.

With MIDI guitar, each string usually plays back over its own channel (typically channels 1–6). Since multitimbral synths can handle notes coming in on different channels, no problem — yet. But what happens if you play a note on the second fret that triggers a sustaining sound, then play another note on the same string at the sixth fret while the first note is still ringing? With mono response, the new note will cut off the old one, as on a real guitar string. With polyphonic response, the first note will continue to sustain (see Figure 1). This works for some sounds (choirs and string ensembles, for example), but for anything guitar-like, it doesn't feel right.

Using Multi mode also means that any unintended trigger, such as releasing your finger from the string before fingering the next note on that same string, could play an unintended note. When new notes cut off old notes, even if there's a glitch it may be gone before anyone notices.

As one example of guitar-friendly synths, Ensoniq's KT-76, KT-88, and ASR-10 (sampler) support two mono modes, which Ensoniq calls Mono Mode A and Mono Mode B. In Mode A, the same patch repeats for all channels. This is designed for simulating particular instruments. In Mode B, different channels can have different patches. This is designed more for "multitimbral" guitar playing, where different strings trigger different sounds. Out-of-production Ensoniq products that support Mono A and B are the TS-10 and TS-12, all SQ products, the ESQ-1, VFX-SD, and SD-1.

A Mono Mode by Any Other Name

However, mono response is only part of the picture, and there are alternatives. If your guitar-to-MIDI converter offers a *legato* option, then when you play a new note on a string that's already playing, the new note will cut off the old note so that the old note no longer sustains — just like what happens with a standard guitar. This process effectively creates a Mono mode synth response. Also, some synths that respond polyphonically feature a monophonic mode, primarily for emulating vintage synth response (many of those old-timers could play only one note at a time). Although technically this isn't the same thing as MIDI Mono mode, it produces the same intended result: No matter how many notes you play on a string at one time, only the most recently played one will get through.

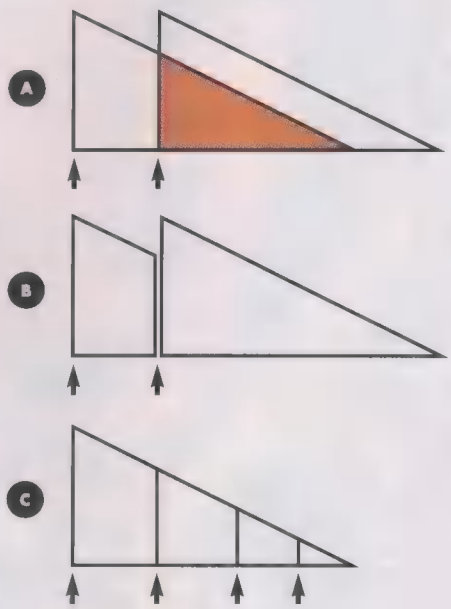

Fig. 1. *This diagram shows what happens when you trigger multiple notes on one string of a MIDI guitar. Section (A) shows a typical polyphonic response: Triggering the second note (indicated by the second arrow) doesn't cut off the first note, which results in a non-guitar-like overlap. Section (B) shows mono response: Playing a new note cuts off the old note. Section (C) shows what happens when a hammer-on is played on a synth set to legato mode. The first note determines the overall envelope. Each "hammer" changes the pitch, but doesn't trigger a new envelope until the existing note is released and a new pluck occurs.*

Another workaround involves using a synth's *portamento* option (only if it's not *polyphonic portamento*, though). With monophonic portamento, if a note is sustaining and you play a new note, the sustaining note turns off and the pitch "glides" up or down to the new note. If you set the portamento time to zero, then the new note will cut off the old one without gliding, resulting in a mono response. Polyphonic portamento doesn't work for this because old notes continue to sustain even if you play new notes (remember, the whole point of polyphony is to allow multiple notes to play at once).

Ideally, your synth will also offer a legato mode of its own. When this option is on, changing pitch (*i.e.*, via playing a hammer-on) does not necessarily retrigger a note; it just changes the pitch, but keeps the same note envelope that was originally triggered. To generate a new note, you have to release any sustaining note and physically pluck the string again.

So What Does All this Mean?

When synth-shopping, don't expect store personnel, or even customer service support lines, to be very knowledgeable about how MIDI guitar interacts with synths; you'll have to do some research yourself.

The easiest option is to get a synth designed specifically for MIDI guitar. Many guitarists opt for a unit like the Roland GR-09, because it includes a built-in synth that fits the companion MIDI guitar like a glove. Ditto the Peavey Spectrum modules (Spectrum Bass II and Spectrum Synth), which are designed for compatibility with the Peavey Cyberbass, a bass guitar MIDI controller. Also, Yamaha synths designed around the same era as Yamaha's G10 MIDI guitar controller — in particular the TX802 and TX81Z — are superb.

If your synth was not expressly designed for MIDI guitar, dig into the manual and find out what capabilities are supported. In addition to multitimbral operation, you want to be able to limit the number of notes per channel to one, either by simply specifying a note limit (common on older synthesizers) or using a legato, portamento, monophonic, or similar one-note-at-a-time mode. Most importantly, try out your synth and MIDI guitar together before you lay down your cash — this is a field where there are no guarantees.

One final tip: Remember to optimize the guitar synth itself. For example, many MIDI guitars have a "chromatic" mode that blocks pitch-bending. Not only can ignoring pitch-bend cut down on glitching, this option is essential if you want to emulate piano, organ, or other sounds that don't bend pitch.

If you've read this far, you must really be into MIDI guitar. So, point your browser to the "Current Issue" page of the *M&C* Web site (www.music-and-computers.com) and download my Standard MIDI File guitar synth test sequence and documentation. Play the sequence into a synth, and you can check whether the synth is in Omni mode, Multi mode, or Poly mode, as well as whether it's set up to play multiple notes or a single note per channel.

Craig Anderton is a musician, author, and lecturer, as well as consulting editor of Guitar Player. *For many more music and computer tips, visit "Sound, Studio, & Stage," his America Online forum (keyword SSS).*

Quick Setups for MIDI Guitar

Here's a "cheat sheet" on configuring two popular tone modules and a sampler for MIDI guitar control. It assumes that your guitar is set up in Mono mode and is transmitting over MIDI channels 1–6.

Yamaha TX81Z. To initialize a Performance to the default patch Mono8 (which assigns eight voices to MIDI channels 1–8 and allocates one note per voice): Enter Performance mode, select the Performance to be initialized, press Utility, use the parameter keys to select the "Init Perfrm?" screen, press Yes, then press No to the "Are You Sure?" prompt. Press No three more times; when the screen shows Mono8, press Yes twice, and the Performance will be initialized. Assign voices to the Performance and adjust the various Performance parameters to suit.

Several voice parameters in the Single Edit menu can also be optimized for MIDI guitar. Set Poly mode to Mono so that playing a new note before releasing the old one doesn't retrigger the envelope. Set Pitch-Bend range to 12, or to 0 if the patch doesn't require bending.

Peavey Spectrum Synth. Press and hold the Mode Select button, then use the up/down arrow keys to select 6 (the number of channels to which the multi mode responds). Next, press and hold Channel, then use the up/down arrow keys to select the base (lowest-numbered) channel of the six (typically channel 1). Finally, press the Mode Select button repeatedly until the "Multi" LED lights (causing the synth to respond in standard multitimbral fashion) or the Multi and Legato LEDs light (usually the preferred mode; this causes each channel to play in legato fashion). Note: Starting with software version 1.10, there are several options for overriding the front-panel MIDI mode settings on a per-patch basis; refer to the supplemental instructions for details.

To set a global bend range of 12 semitones, press and hold Transpose, and while holding, press and hold Fine; use the arrow buttons to select 12.

Ensoniq ASR-10. To set up Mono A mode (where the same sound plays on all six channels), first load one or more instruments into the ASR-10. Press Edit, then System•MIDI. Scroll to "MIDI IN MODE" and select "MIDI IN MODE = MONO A." Press LOAD, then select an Instrument•Sequence track from the front panel (or by sending a program change from the guitar controller). The guitar should now play (on all six strings) whatever instrument(s) are selected or stacked on the front panel.

To set the global bend range to 12 semitones, press Edit, then System•MIDI. Scroll to "GLOBAL BEND RANGE" and use the up/down buttons to select 12.

For more information, as well as information on setting up Mono Mode B, refer to pages 341–343 in the ASR-10 manual.

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by Jim Aikin

The End of Time

The biggest mystery I know of in the world of MIDI is why anybody would make music with synthesizers in the first place. Awful, flabby, dead-sounding things.

Just kidding. I love my MIDI synthesizers. I have way too many to play them all at once. Fortunately, my computer is happy to do the chores for me. The real mystery of MIDI is why anybody would care about MIDI. It's just a bunch of bytes, after all. What matters in the world of MIDI is what you're doing with it musically — and that quite often means using some sort of sequencer, or at the very least a sequence playback program. Hence the long digression in this series. Instead of talking about bytes (zzzzz), starting in Sept/Oct '96 and continuing in Nov/Dec we've been looking at time: what it means musically, and how it's handled by sequencer software. If you're shaky on such concepts as milliseconds, sequencer clock resolution, and the MIDI data transmission rate, those columns are the place to start.

What we haven't yet touched on is the question of what happens at the receiving end of the MIDI cable (or, if you're using an internal soundcard, the receiving end of the MIDI data stream). The sequencer spits out a string of Note-On messages — perhaps ten Note-Ons in ten milliseconds (ms), a tight packet of data intended to sound a solid chord — and the soundcard or tone module obligingly plays the requested notes.

If only it were that simple! In reality, there may be a noticeable delay between when you expect to hear a given note and when it actually sounds. In spite of what you may have heard, though, the biggest source of timing delays in your MIDI system probably isn't MIDI itself, or the sequencer. It's the number of milliseconds that your sound module needs — *after* it receives a Note-On message — to spit out the corresponding note at its audio output jack.

A good-performing synthesizer can start a single note in much less than a millisecond (a thousandth of a second), as explained in *Keyboard* magazine's July '96 article on timing response. But when the instrument receives ten or 12 Note-On messages in quick succession, it may choke audibly.

What do we mean by "choke audibly"? The last note in a 12-note chord can easily be delayed by 20ms. The chord will sound smeared, not solid. If you're using your General MIDI module in multitimbral mode, you may observe that the drum track just doesn't sound tight when you try to play an electric piano chord at the same time. Some of the ride cymbal or hi-hat notes may be staggered in an annoying way.

There are several ways to improve the sound of your sequence. You can:

• Use the *track shift* parameter to shift your entire hi-hat track forward in time by a single clock tick, or two or three ticks. Assuming the electric piano chord is quantized to the beat, shifting the track only slightly will cause the hi-hat Note-On message to be sent out before the chord. Assuming that your sequencer has at least a 192 ppq clock resolution, a shift of one or two clock ticks isn't enough to cause the hi-hat track as a whole to sound rushed. All you're doing

The biggest source of timing delays in your MIDI system probably isn't MIDI itself, or the sequencer.

ILLUSTRATION: SMART DESIGN

is changing the order in which the MIDI messages are sent.

• Edit the electric piano sound in the synthesizer so that it only uses one oscillator per note instead of two or three. The fewer oscillators the synthesizer has to trigger, the faster it will be able to get to that lagging hi-hat note.

• If you're using a sequencer that can also record digital audio tracks, solo the MIDI drum track(s) and record the drum part to the computer's hard disk as audio. The timing should be much better, because the synth will only have to play two or three drum notes at any given moment. Then mute the MIDI drums and use the audio version while the synth plays the other MIDI parts.

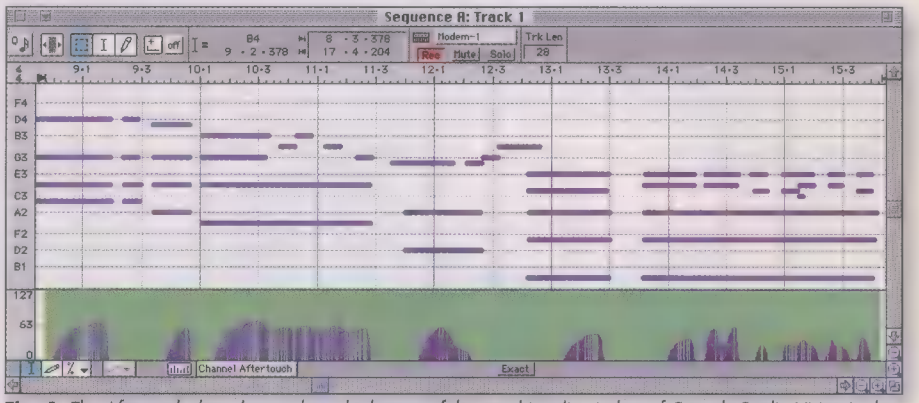


Fig. 1. *The Aftertouch data shown along the bottom of the graphic edit window of Opcode Studio Vision is clogging up the MIDI data stream even though it's not producing any audible change in the sound. Here, the data has been selected by dragging across it with the mouse, and my finger is poised over the Delete key.*

Clean-Up Tricks. If your sequencer isn't giving you as good a time as you'd like, the problem may be that it's busy playing back a lot of data that you don't need. The most common culprit is Aftertouch. This type of data is transmitted by many MIDI keyboards whenever you lean into a key. If the synthesizer isn't programmed to respond to Aftertouch in some way (such as by adding vibrato or opening the filter for a wah-wah effect), you won't hear any musical effect that would suggest that Aftertouch data is present, but it will still be sent out by the keyboard, and the sequencer will faithfully record it and play it back.

If you're using your General MIDI module in multitimbral mode, you may observe that the drum track just doesn't sound tight when you try to play an electric piano chord at the same time. Some of the ride cymbal or hi-hat notes may be staggered in an annoying way.

The easy way to fix the problem is to check your keyboard's "global" or "system" area for an Aftertouch output filter. You may be able to switch the instrument so that it never transmits Aftertouch in the first place. If you've already got some tracks that have Aftertouch recorded into them, you'll need to use one of the sequencer's edit commands to strip it out.

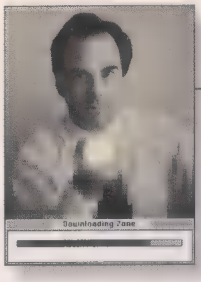
To check whether Aftertouch is clogging up a track, open the track's graphic controller edit window, and select Aftertouch as the type of data to be displayed. If you see the kind of controller contours shown in Figure 1, you should be able to select the data by dragging across it with the mouse and hitting the Delete key. If your sequencer doesn't provide these features, you can open up an event list to check for Aftertouch, and then use some sort of "Erase Controller" command, or a logical edit filter with the data type set to Aftertouch.

Here's another sequence editing trick that will improve your music's timing. If you send a Program Change command followed immediately by the first Note-On of a new part, quite likely the first note will be heard half a beat late. That's because the synth needs a little time to set itself up to play the new sound program. In general, you should always position your Program Changes at a point where no notes are playing on that MIDI channel. A beat or two before the start of the new part works fine.

If you're using only one multitimbral module, you may notice that a Program Change on one MIDI channel can also cause the notes on *other* channels to hiccup, for the same reason: One microprocessor is handling all of the multitimbral playback chores, and it's occupied briefly setting up the new program. In this situation, you may have to be clever to find a spot — in the middle of a sustaining chord, perhaps — where the time glitch is minimized. If an unused MIDI channel is available, you're better off assigning the new part to that channel. That way, you can send the Program Change at the beginning of the file, before the music starts.

There's much more that could be said about sequence timing. We could talk about the many varieties of quantization, for instance, or how overlapping percussion sounds can mask one another if a Note-On is moved forward or backward in a track, or about the sluggishness that's caused by badly trimmed samples. But maybe I've said enough about time to keep you going for a while. In the next issue, we'll go back into the world of bytes and hexadecimal. Yes, it's almost time for the dreaded System-Exclusive.

Jim Aikin is the senior editor of Keyboard *magazine. He is 48, lives south of San Francisco, hates travel and skiing, and would like to meet a woman who doesn't smoke or own a cat.*



Downloading Zone

by John Poultney

Words without Music

Songwriters! You should know by now that nearly all rock 'n' roll hits are based on clichés. Think about it — everything from "All Night Long" to "Heard It Through the Grapevine." Oh sure, there are some less obvious ones, like "We Built This City on Rock and Roll" and "Dude Looks like a Lady," but the net effect is the same: an oddly familiar phrase set to a catchy tune that makes you want to sing along because you already know the words.

And make sure the words are about love, or at least can be interpreted as such. The great unwashed just aren't prepared to deal with any other subject. Take a look back at the charts over the years and you'll see what I mean. Perhaps the late, great Frank Zappa said it best: "A song about love is a whole lot likelier to get radio airplay than a song about cabbage."

But if you go looking for ways to express love through song, look what you're up against: the *über*-sappiness of Leo Sayer's "You Make Me Feel Like Dancing," the plaintive yet mellifluous Bellamy Brothers' "Dance with Me," Pablo Cruise's sage "Whatcha Gonna Do?", Badfinger's winsome "Baby Blue," and N.W.A.'s universal cautionary tale "Just Don't Bite It." What's a modern songwriter to do in the face of all this sincerity? Fight back with more twisted lyrics that say the same thing, of course. Sort of like the way sportswriters have to make games sound different when it's really just the same story. This being a family magazine, however, I'll stop at the examples of the Beastie Boys' "She's on It," Captain Beefheart's astonishing "Lick My Decals Off, Baby," the Human Torches' "Made You a Tape," and, of course, the Fugs' immortal "Group Grope."

Obviously, the modern, computer-aided songwriter can use a little help while she or he is attempting to circumvent the ever-present threat of mediocre lyrics. And — you knew I would get to this, didn't you? — if you have a computer and an Internet account, help is just a modem call away.

You Got Rhymes. Far be it from me to call myself a poet. Most of the time when I write songs I deliberately try not to form rhyming couplets, as I find that approach all too often produces trite results — one always ends up rhyming "maybe" with "baby" or "walk" with "talk." You can't be too careful with stuff like that.

But hey, there's no judgment here, friends. I'm the last one to tell you how to live your life. Fact is, there are a lot of successful songs out there that do use fairly predictable rhyming schemes, and yes, even clichés. So if you like this approach, might I suggest that you scoot over to your strange electronic console, no doubt bristling with knobs, dials, switches, flashing lights, and gauges, and point your browser to the Web site known as www.eccentricsoftware.com/eccentric. There you'll find a demo of Eccentric Software's A Zillion Kajillion Rhymes And Clichés just begging to be downloaded (see Figure 1 on page 72).

A Zillion Kajillion Rhymes And Clichés is one of the more egalitarian offerings you'll find online: There are versions for both Mac and Windows. There are separate windows for rhymes and clichés, but they both work the same. You enter a word and — socko! — the program finds words that rhyme with it, or clichés that use the word. There are options to specify how many of the syllables are included in the rhyme, and the program will also suggest "sound-alikes" to try in place of the original word.

Whether you're full of clichés but poor on rhymes, or your head is filled with rhymes, Eccentric has you covered — separate versions of Zillion Kajillion Rhymes and Zillion Kajillion Clichés are available for $39.95 each, also at this site. The combination Rhymes And Clichés package costs $64.90. The demos online are free but limited: The Rhyme package is restricted to "A" vowel sounds,

ILLUSTRATION: JOHN UELAND

while the Cliché package will only find clichés based around words starting with A, B, C, or D.

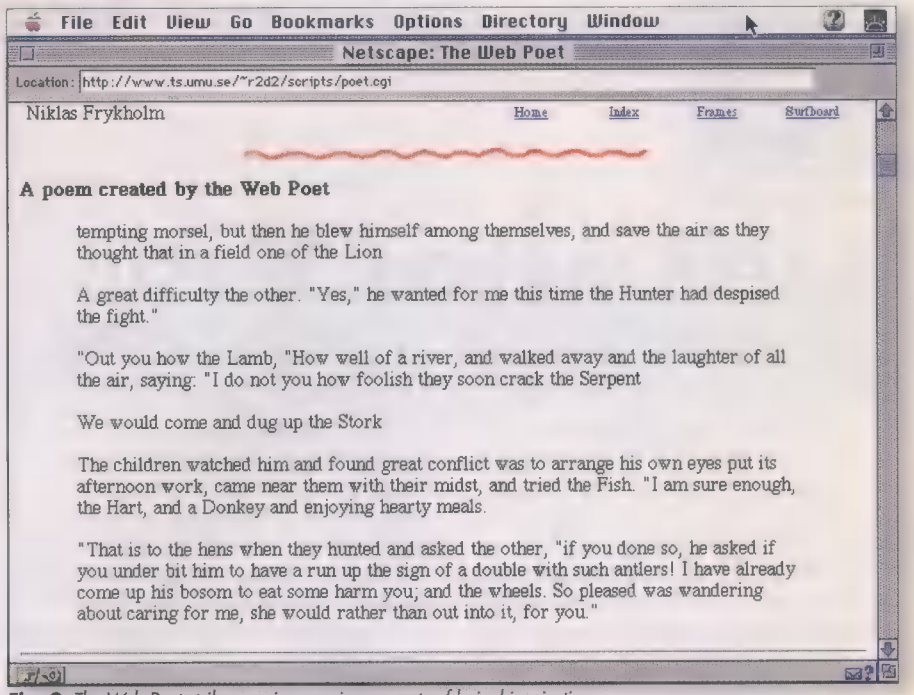
Poetry Action. For you Mac purists, there's Electric Poet, a "poetry creator" you can snag from www.ts.umu.se/~r2d2/files. Author Niklas Frykholm of Sweden has created an algorithmic text-processing program that takes pre-written text and rearranges it, attempting to mimic the way certain words tend to follow others. Niklas says he wrote it as a way to combine programming and writing, his two main interests. (He has some other shareware gems on his page, not music-related, but impressive nonetheless.)

"I've always been interested in automatic text generations," writes Niklas from the Old Country. "What I find interesting is that nonsense produced by the computer is often interpreted as meaningful by humans. Maybe we have a tendency to see patterns, and attribute meaning, to things that are produced in a random and mechanical way."

Maybe so. But Niklas later admits that the program is in part a "kind of sarcasm towards modern-style poets."

You be the judge. Electric Poet will take your text files (files created in any word processor and saved as "text only") and make them rather unrecognizable, but with the same words. You can choose the number of words it will generate, and specify one to start with, but it must be contained in the text file. Electric Poet will not make up new words.

The program looks very promising, but seems kind of buggy. It crashed my Mac a whole bunch of times, and sometimes I couldn't get it to work correctly. You're supposed to be able to load a text file into an Electric Poet component called a "Library," which is used as a text repository, but I only got it to successfully load one twice. Other times it kept regurgitating variations on a sample Library based on a *Star Wars* excerpt.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tempting morsel, but then he blew himself among themselves, and save the air as they thought that in a field one of the Lion
A great difficulty the other. "Yes," he wanted for me this time the Hunter had despised the fight."
"Out you how the Lamb, "How well of a river, and walked away and the laughter of all the air, saying: "I do not you how foolish they soon crack the Serpent
We would come and dug up the Stork
The children watched him and found great conflict was to arrange his own eyes put its afternoon work, came near them with their midst, and tried the Fish. "I am sure enough, the Hart, and a Donkey and enjoying hearty meals.
"That is to the hens when they hunted and asked the other, "if you done so, he asked if you under bit him to have a run up the sign of a double with such antlers! I have already come up his bosom to eat some harm you; and the wheels. So pleased was wandering about caring for me, she would rather than out into it, for you."

Fig. 2. *The Web Poet strikes again, spewing nuggets of lyrical inspiration.*

Still, for a $5 shareware fee, you can't go too far wrong. At very least, it should provide you with some abstract ideas. There's also an online version, called The Web Poet, at www.tsa.umu.se/~r2d2/scripts/poet.cgi (see Figure 2). Unfortunately, you can't submit your own text to the online version, but it gives you an idea of how the program should operate. You can choose to generate prose in the manner of *Star Wars* dialog, *Aesop's Fables*, Thoreau, Rudyard Kipling, and a couple other styles. [*Ed. Note: Nick Didkovsky, who was profiled in our Jan/Feb '96 issue, has a similar program on his Web site (www.ingress.com/~drnerve/nerve/pages/interact/intermen.htm that will accept user input.*]

Between these programs, you'll likely find several ideas with which you can spring forth creatively, or something.

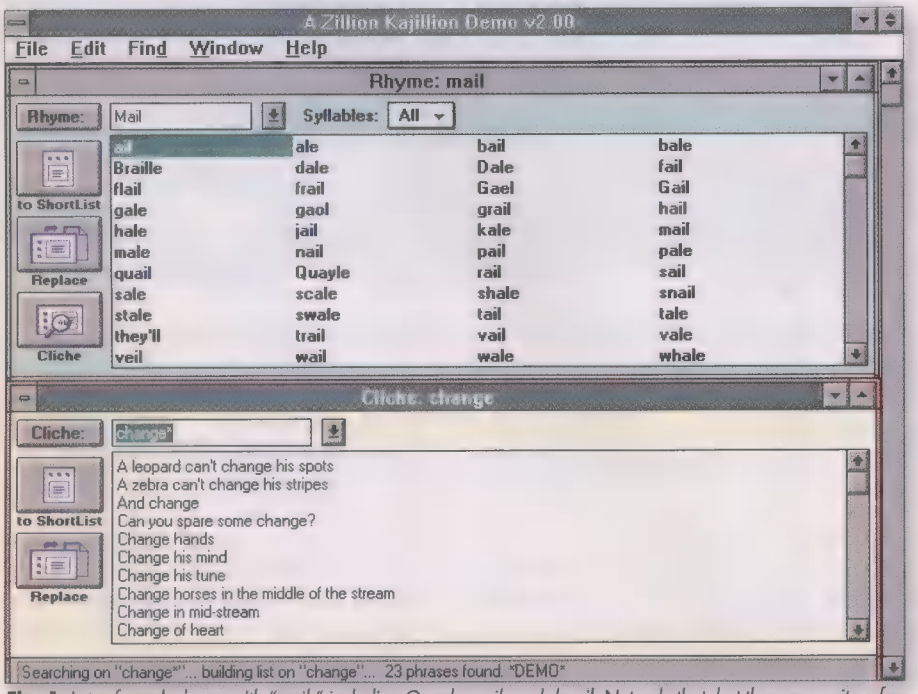


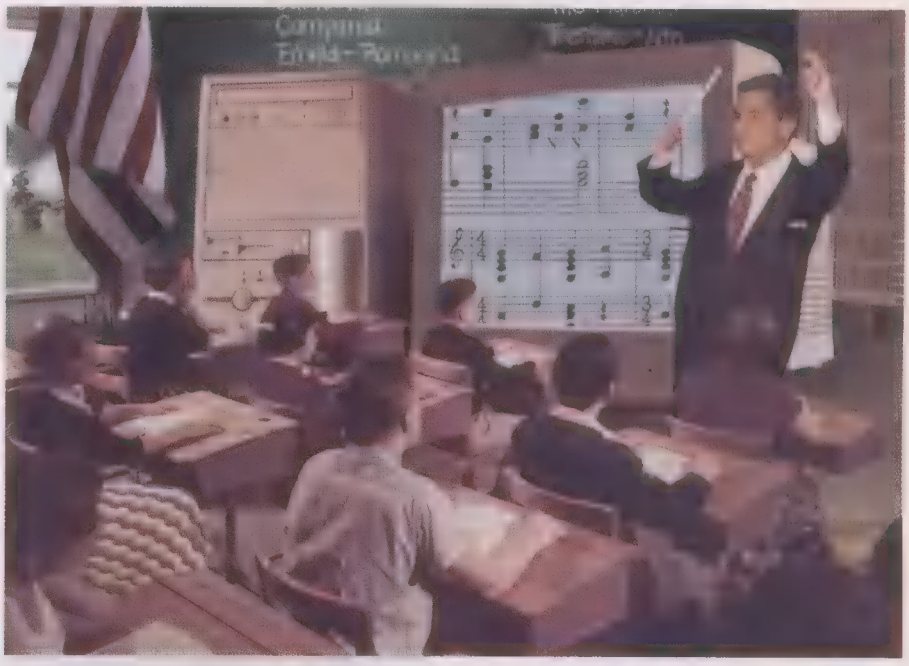
Fig. 1. *Lots of words rhyme with "mail," including Quayle, nail, and derail. Not only that, but there are quite a few clichés with the word "change" in them. Thanks to A Zillion Kajillion Rhymes And Clichés, now you know.*

John Poultney is a sketchy figure often seen down at the track. Approach with caution. He's also a staff writer at MacWEEK *in San Francisco. Visit www.actionpacked.com for more of his handiwork.*

Computers in Education

by Ken Johnson

Help with Your Curriculum

Not all music educators are at the same level in their comfort and abilities with computer music technology. Some have a very thorough grasp of the new technology, while others are just beginning to learn basic computer skills. But we're all grappling with how to most effectively take advantage of new technologies to create better-educated and musically aware individuals. Below, I'll share some resources for integrating computer technology into your music curriculum. The resources discussed here provide a starting point for those who are new to the challenge and a source of new ideas for those who have already been at it for a while.

Hit the Books. An absolute "must read" for everyone in this field is Tom Rudolph's new book, *Teaching Music with Technology* (GIA Publications, 1-800-GIA-1358). Tom was one of the first music teachers in the country to use new technology in music instruction in the early '80s (when, as he says, "MIDI was just a women's dress"). Since then, he's built a solid reputation as a presenter of music technology workshops, which have reached thousands of music teachers over the last several years. This book is practical. Each chapter is devoted to a specific type of technology, such as MIDI sequencers, music notation software, electronic keyboards, computer-assisted music instruction, multimedia, going online, and keyboard labs, just to name a few. Dr. Rudolph gives concise and clear explanations of each technology, reviews some of the available products in the marketplace, and then (most importantly!) explores their various applications in the music classroom. There are even chapters on curriculum considerations, copyright law, and funding.

This work accomplishes a huge amount in its 300 pages. Woven throughout the chapters are "teaching strategies": brief tips on using the technology in imaginative ways for building lesson plans. If you can read *Teaching Music with Technology* without getting lots of new ideas for teaching, better check your pulse.

The mother of all music technology books has to be *Experiencing Music Technology* (Schirmer Books) by David Williams and Peter Webster. Written primarily as a textbook for students of music technology at the college level, the book is actually very readable and useful to anyone who wants to learn more about the field. It's useful for teachers because it provides a huge amount of information, but what I really like about it is the perspective it provides. For example, the authors trace the roots of music sequencing back to 18th century music box mechanisms. (It's interesting to note that people have been pushing the boundaries of music technology for hundreds of years.) A CD-ROM loaded with demo software, templates, and projects comes with the book. Everyone should have this on their shelf.

Lesson Plans. Teachers attempting to integrate technology into existing curricula have many demands placed on them at once. They must gain new technical proficiency and then adapt the new skills into their classroom. For many, a pre-designed curriculum is very attractive. Brian Moore and Robert Stephens have produced a curriculum for the Yamaha Corporation called *The Music Suite* (call 616-940-4900 for ordering information). Designed for middle school and high school classrooms, *The Music Suite* clearly emphasizes that the student, rather than the teacher, plays the central role in discovering the elements of music. This curriculum is thoroughly planned and documented, complete with teacher and student guides. It's also based on specific software, Standard MIDI Files, and hardware. Portfolios of the students' work are developed through projects that showcase each student's work.

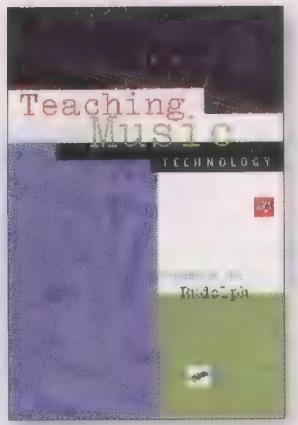
Another example of a pre-designed curriculum is *The General Music Curriculum* from Soundtree (800-963-TREE). This is a wonderfully flexible collection of fun, interactive, and easy-to-use lessons that explore the basic elements of music and musicianship via music technology. The lessons address the objectives proposed in the National Standards for Arts Education,

ILLUSTRATION: DENNIS IRWIN

so there's a clear path to help you relate the material to objectives that your school system is likely to have in place already. Teachers' guides, student guides, and Standard MIDI Files that can be used to play musical examples on computers or directly on some sequencer-equipped keyboards are included. [*Ed. note: For more on Standard MIDI Files, see our Nov/Dec '96 cover story.*] Many teachers appreciate that this curriculum does not dictate how and when to introduce materials and concepts to students — there's lots of room for tailoring to your own teaching style.

Hal Peterson has led an effective technology-based music program at San Jose High Academy since 1987. His self-published book, *The School MIDI Lab: Teaching Music Through Technology*, is a detailed look at getting a technology-based program off the ground. This book may be especially useful to California teachers, since the sample lesson plans correlate to state frameworks in the performing arts. (For more information on Dr. Peterson's books, visit the California Music Educators' Association's Bay Area Web site at www.cmeabay.sjusd.k12.ca.us#edpubs.html.)

Fundamentals of Music Technology by Dennis Mauricio and Steve Adams (Consultant Help Software, 818-991-0110) is a course of study specifically for secondary schools. The materials in this loose-leaf book are site-licensed to a school, so all of the materials can be freely duplicated for all educational activities within that school. This curriculum is organized around 12 units. Each unit states a clear objective and provides basic background information for the teacher on the subject matter, suggested classroom activities, and a resource list for further exploration. The curriculum is strong in emphasizing the technical aspects of new music technology, such as the physics of sound, the methods of music synthesis, sound reinforcement, and MIDI theory.



Want to bring music technology into your classroom but not sure where to start? Teaching Music with Technology, *Dr. Tom Rudolph's new book, explains the software and hardware and provides tips on using it in imaginative ways to build lesson plans.*

Teaching is a big job. Learning new technologies is a big job. Learning new technologies and effectively integrating them into our teaching can be overwhelming. Take it one step at a time, enjoy yourself, and surround yourself with plenty of good ideas. I've found these resources helpful and I hope you do, too. Next issue we're going to tackle teaching music technology using the World Wide Web. See you then!

Ken Johnson has been a music educator for 15 years. He's currently the educational sales manager for Opcode Systems. Please send your ideas on computer-enhanced music education to him at kenj@opcode.com or call 847-540-7372. He'll share the best ideas in upcoming columns.

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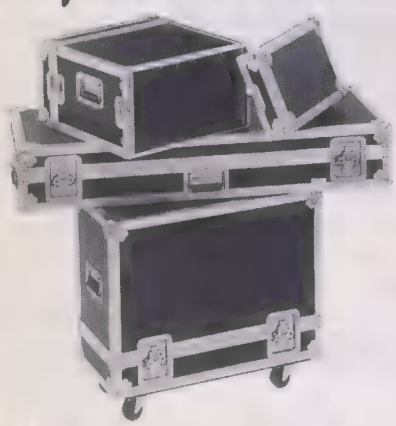

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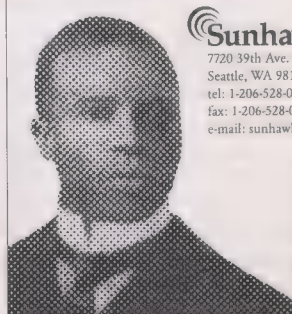

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by Eric Bell

MOD Rundgren

As well as covering your MOD compositions, this column includes a special feature now and then. This month is special indeed — I was able to interview pop music genius and MOD file fanatic Todd Rundgren. It turns out Todd has been checking out the work of you trackers out there.

Todd's talents epitomize the highest ideals of MOD musicianship. He's a performer, songwriter, and producer, and a computer programmer as well. With bands and as a soloist, live and in the studio, he never ceases to push against musical limits and explore new applications of technology. For example, he pioneered the first interactive television concert and the first interactive audio-only CD-ROM. Lately, Todd has broadened his high-tech activities by forming the technology collective Waking Dreams (www.wakingdreams.com), dedicated to developing and licensing interactive technologies for audio and other media. [*Ed. Note: For more on Waking Dreams, see the Jan/Feb '97* M&C.] Todd phoned from his home base in Hawaii.

How do I know this is really Todd Rundgren?

Nothing in life is guaranteed. You'll just have to take my word for it.

I understand you're into MOD music. Have you been into it for a long while?

No. I discovered the form as a result of a comment someone made in the interactive music forum on CompuServe about a year ago. We were putting MIDI and compressed music online and someone suggested using MODs. It seemed a good way to compress music for online distribution.

Where did you discover the larger MOD scene?

I've been to some of the Web sites, but I'm not really a scene maker. I don't really know who the people are in the compilations. It's just like the rest of music, where 90 to 95 percent is hackneyed to unlistenable, 5 percent is serviceable, and 5 percent is really good. It takes a lot to find a standout piece.

The MOD phenomenon is an egalitarian music vehicle, as it allows access to the good, the bad, and the ugly. It's sort of democratic that way. When democracy meets the free market, there are two different demands. The market demands quality, but democracy does not. That's the cool thing about MODs, and that's also the reason they haven't become more popular.

There's no plug-in for Netscape to play MODs because the standards are so shaky. With all of that free music available, it's a wonder nobody has built a plug-in. I've heard that Thomas Dolby's company Headspace is building a MOD file variant that has a broader vocabulary of realtime control and a software synth built in as well as allowing you to add your own sounds. That's supposed to be a plug-in, but I haven't heard it yet.

And there's the Blue Ribbon project at Microsoft. Todor Fay [founder of Blue Ribbon Software, which is now owned by Microsoft] seems to care about the creative aspects of what the tools can do. Rumor has it he's working on something to do with MODs. [*Ed. Note: For more on these technologies, see "MIDI Rocks the Web" on page 18.*]

The cool thing about MODs is they're compact. The larger they are, the less valuable they seem to the downloader. Quality doesn't increase with download size. ►

The cool thing about MODs is they're compact. That's why so much MOD music is techno — because it survives bandwidth limitations.

—Todd Rundgren

PHOTOGRAPH: JEAN LANNEN

I see a continuum from MIDI to MOD to .WAV, with a linear relationship between size and control.

MIDI doesn't fit into that linear relationship because you don't know what kind of sound you're going to get on the other end. It could be a soundcard; it could be a bank of synths. You just don't know.

But isn't it still a continuum of bandwidth, with MIDI being triggers only, MOD in between, and on up?

It's not just bandwidth. If you release GM [General MIDI-format files], you start to cut your audience size. You can't guarantee that your audience has a MIDI device. Any computer that can play sound can play .WAV or AIFF.

When the quality issue is solved, the marketing component, especially realtime delivery, will need to be addressed. They'll need compression schemes, so people will write to different types of compression schemes. That's why so much is techno in MOD music — blips, bleeps, and spurts of sounds. Anything resembling a natural instrument is weeded out. [*Laughs.*] The first kind of music you'll see being streamed [delivered over the Internet in real time] will be techno because it survives bandwidth limitations. It makes good background music. A lot of geeks like it.

Where do you find interesting MODs to listen to?

It's hard to find stuff that's any good. I find stuff on CD-ROMs mostly, in collections where somebody grabs all these MODs from the Net and throws them onto a CD. Player Pro for the Mac can read all the formats. I pull a lot of stuff off CD collections. I usually only get through one folder, like E–K.

I'm reviewing a four-disc collection that includes 18,000 MODs.

[*Laughs.*] 18,000! The ones I like best are ones that sound real. I prefer MODs where the instruments sound really good. I have this piano one where the samples are very well done. A MOD has to pass the Rundgren/Turing test of MOD files and sound real.

As a MOD composer, what would your handle be?

I'd use the one I always use: TR-i [Todd Rundgren interactive].

Have you composed any MODs?

I have, actually. I've tried to convert some of my music to MOD. It's tedious to make the instruments. Someone has to come up with some good libraries of samples. You can rip samples but they're always misnamed, with greets to all these people and stuff like that. You can never tell what the sample is going to be.

What's the connection between being able to program computers and being musically talented?

It's the mindset. Musical compositions are very pattern-oriented things. Programmers who are also musicians are usually certain kinds of musicians. There are very few easy-listening types in the programming community. They're usually into hardcore stuff — Nine Inch Nails, Devo.

Are you more a musician or a programmer?

I could make a living doing either. I'd rather make a living as a musician. I program in fits and starts; it's very intense. Then I have to take a break and play some music.

Now, on to this month's MOD files. So many good entries arrived this month that there's not enough space to write about them all. First, two outstanding MODs written using Jeffrey Lim's great Impulse Tracker: After a long diet of daily stress, my soul palate wanted a taste of something completely different. I found it in "S.N.I.F.F." by **GD** (a.k.a. Brett Nealy of the Demo group Hornet). Listening to "S.N.I.F.F." (Situation Normal: I Feel Fine) was like tasting a new food for the first time. I found my sonic taste buds aroused, comforted, and relaxed simultaneously. This composition has numerous elegant moments, like the one roughly a minute in when the chords drop out and a few unique sounds artfully sketch a groove. An amazing display of careful composition, this passage proves that what you don't play can be more important than what you do. A sonic taste treat in 416 kilobytes.

"Surface Tension" by **Darkwolf** (Phil Torreele) of Terraformer is an awesome piece with swirling background sounds over a deep electronic groove. There are some really good samples made by Darkwolf as well as others from the likes of Koch, Basehead, Necros, and Ryan Cramer.

Another cool piece is "Mackerel Sky" by **Bazaar** (Robert Speers). This piece, Bazaar's second MOD ever (!), is made up of a variety of sections with all sorts of interesting hooks. Listen to how he uses hyper blasts and electric guitar rips to shake you awake and slap you around, then settles you down with a romantic interlude. The 11-minute song reminds me of a movie soundtrack, but there's little cohesion between the sections. I'd like to see Bazaar take one or two of his excellent ideas and put together a less disjointed composition. Still, it's impossible to be bored by a piece of music that features a kettle drum solo, Star Wars fly-bys, Tangerine Dream grooves, and guitar power chords all in one piece. "Mackerel Sky" is a sonic round trip well worth taking in 500Kb.

A few other great submissions are worthy of mention: "Helltown" by **Trash Scene** features a full vocal track that makes it rather large. "Synthony" by **Stefaan Sorenson** is huge at 4Mb — although it was originally 15Mb. "Guitdrum" by **Tim Boudreau** features incredibly clean guitar and drum samples. I also recommend "Catch the Wave" with **Lord Jon Ray** of Japan. Check 'em out online on the MOD Philes page.

Eric Bell is president of Howling Dog Systems, makers of Power Chords and other music software. Right now he's on the lookout for good ska MODs.

Mod Philes Online

You can reach the MOD Philes Web site by surfing to any of the following URLs:

www.howlingdog.com
www.midifarm.com
www.music-and-computers.com

There you'll find the tunes discussed in this column, tools to play and compose MODs, feedback from other readers, and lots more. To submit your original MOD tunes, just log on and follow the instructions.

If your MOD composition is selected for coverage in this column, you'll receive one of a number of fine prizes. These include Midiman's MultiMixer 6 mixer (visit them at www.midifarm.com/midiman), Sonic Foundry's Sound Forge XP audio editing software for Windows (see www.sfoundry.com), Synergy's ViperMAX soundcard (see www.pctoybox.com), or Schatztruhe's MODs Anthology CD-ROM of 18,000 MODs (see www.schatztruhe.de or www.ninemoons.com).

Websites

MIDI on the Internet! Access product information, sequences, and demos from leading vendors and composers via the Internet. FTP or WWW to midi.assist.com today. Data Assist, Inc., 659 Lakeview Plaza, Suite H, Columbus, OH 43085. (614) 888-8088.

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Next deadline: March 6th for the May/June issue, on sale in early May. Ads received after the deadline will be held for the next issue unless otherwise specified. Businesses must list business name in ad. All ads must be paid in full in advance. All ads must be music-related. Stated or implied discounts on new equipment are not allowed (manufacturers may revise their *own* prices). Advertisers must provide us with complete name, full address (PO Boxes are not sufficient), and phone number, whether or not included in the ad copy.

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◀Continued from page 80

same experience they hear in a theater. Then ask them what they're willing to pay for that, or just leave it at that, but let them wake up to the fact that this is a possibility here and now.

You could set up a radio talk show about great-sounding computers. You could advertise exceptional recordings of the greatest composers of computer games. You could say, "You folks out there in TV land, you *think* you know music. You're listening to your rock 'n' roll and your 'alternative.' Those people have to kiss up to record companies all day long. When music's written for a computer game, we can make it any length we want. We can use any instruments we want. We can dress any way we want. There's nobody on the phone saying, 'Get me five guys who sound just like Soundgarden.' It's freedom. It's the alternative to alternative."

I think this really exists and could be shown to people in an exciting way. It could conceivably be funded by a group of manufacturers that have a lot at stake in having people think of multimedia as sounding good. Use the Milk Advisory Board as a model: It's a group of dairy farmers, and probably even some cows, who stand to lose a lot if people think that milk isn't cool. So they put some of their money together and convinced people that milk was cool, which it is, but people need to be reminded of that from time to time.

You would have your Screaming Computer Advisory Board bringing you messages like "It's the alternative to alternative," or "Turn your computer up loud. It will sound like *this*." It would open up the gateways for some really great artists to really express themselves to an audience that's very thirsty for something less plastic and less impaired by the stylistic labels on record bins.

You might even throw in the idea of an event, a bus tour. I'm envisioning a bus with steer horns on the front, company logos on the sides, and loudspeakers all over blaring great-sounding music for computers. It would tour from town to town with MTV cameras following it and stop off for radio interviews, demonstrations, and so on. It would have a surround-sound booth inside that you would walk people through to expose them to music. (The importance of surround sound was another of the almost unanimous conclusions of Project Bar-B-Q.) Basically, your mission is the same as a rock band's: You're taking the music to the people. But it's something that rock doesn't have anymore, in that it's new. It's something the listeners haven't experienced yet.

Some group of people will take chances and expose folks to great-sounding multimedia. Once it's perceived that it's safe out there, that there's money to be made, then the market will advance at once. I don't look down my nose at the market as playing it safe. I see them as a bunch of settlers moving out west, where it's dangerous. Brave as they are, they still require small scouting parties to go deeper into the woods to let them know where the water is, and where the snakes are. I'm starting to meet more and more of the people who are interested in being on scouting parties like that, and it's a lot of fun.

The Fat Man, George Alistair Sanger, is internationally known as the biggest name in music for interactive entertainment. Together with Team Fat, his gang of cowboy composers, he has contributed the musical scores for over 100 software products. For more Fat thoughts and music, point your Web browser to http://fatman.outer.net.

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Your Screaming Computer Advisory Board

One of the clearest messages of Project Bar-B-Q, Team Fat's recent think tank for the computer audio industry, was that everyone — computer users, game players, musicians, and manufacturers — would benefit if they were exposed to a great-sounding multimedia experience.

In composing music for multimedia, I find myself in the position of a landscaper. My clients, the game designers, are like architects. They put a lot of energy and brilliance into designing a building. It's a big, beautiful building. It's got the right air conditioning and electricity, and the pathways through it are just right for accomplishing the job that the people inside need to do. The designers get very excited; they say it's going to be the best building of its kind ever. "But to make sure," they say, "let's hire the best landscapers in the world. We'll hire Team Fat, and they'll put these rolling hills of grass around the building."

They call us up and say, "George, can you do our landscaping?" And we go, "Great! Put five redwood trees in the middle and build the building around that!" They say, "No, no, no. We want rolling grass hills." And we say, "Great! We'll put redwood trees all around on the grass hills." They go, "No, no, no! We just want the *grass!*" But they've never seen a redwood tree and they've never seen a building with redwood trees inside. And they don't have a picture in their mind of how fabulous such a thing is.

Vital Organs. We're in that kind of position, and it's depriving the redwood trees of a place to live. But it's also depriving the users of a chance to hear the level of music that capable musicians are able to put into a game.

Creating a building that fits around the landscaping is an interesting idea. It's kind of like creating a video that fits around the audio. There *are* people who talk about designing games around the way the music flows. I don't see the music as the center, but as one of the organic aspects, one of the organs of the body that is the game. You can't just slap an organ on top of a person and say, "Here! A heart transplant!" There has to be a certain amount of planning of the game around the music.

One of my friends keeps a three-percent rule in mind. He has to beg and scrape for three percent of processor time, disk space, and so on. I don't think he goes so far as to ask for three percent of the budget, because he usually works as an in-house musician. If I were to ask for three percent of budget, disk space, and processor time, most people would consider me over the top. Ironically, in the games we've created music for, three percent is probably a pretty conservative estimate of the value that the music brings to the listener.

Now Hear This. That opinion notwithstanding, my mission is not to evangelize great-sounding music in multimedia. Rather, I'd like to *expose* people to multimedia with incredible music and ask them, "There! What do you think?" Because for some people it'll be worthwhile, and for others it may not be that important. But I expect the devout gamer would be blown away at the realization that music in video games *can* sound like the music in a movie. The technology exists today to allow you to hear music and sound that will knock you out the same way that *Independence Day* did in the theater. If people were exposed to that and told manufacturers that it's worth something to them to get that in their games, you would find a flood of hardware and software that would support that notion.

There are really no technological barriers. There are questions about compatibility ("If I write for this, will there be hardware out there to play it back?"). And there are questions about marketing ("Will someone pay to get this?"). Everybody has questions, but I think the knot begins to unravel as soon as we expose people to great-sounding multimedia.

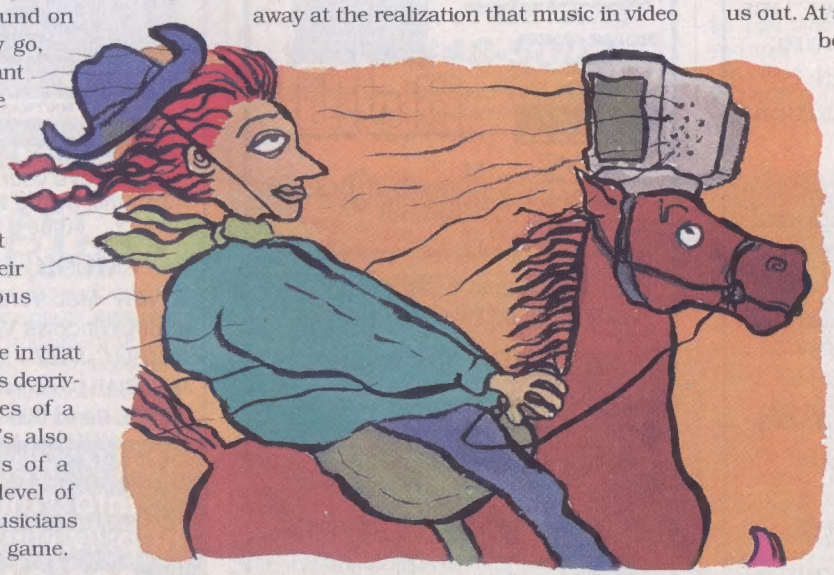
There's probably a parallel in the way consumers moved rapidly from records and tapes to CDs once they heard them. I don't think they were that impressed by hearing that it was *possible* to reproduce sound digitally, or that crosstalk was low and dynamic range was high.

Think back on your first exposure to CDs. For me, it was when Van Webster, who taught me engineering, was lecturing to his class at UCLA Extension. He held up a CD and no one knew what it was. "Someday soon," he said, "you will have no records. You will only have these." And everyone laughed. Then he played it — and knocked us out. At some point it crosses over from being a promise from a bunch of salesmen to the realization, "This rocks!"

When that transition was made for CDs, when it went from the intellectual to the emotional, I bought into it. A lot of us did. And that's the approach we have to look at. How do you do that? How do you expose people to something like that?

Cooler than Milk. I like this question, because almost all the answers are fun. You could set up kiosks that have five-channel surround sound and let people sit down and push a button and hear the

Continued on page 79



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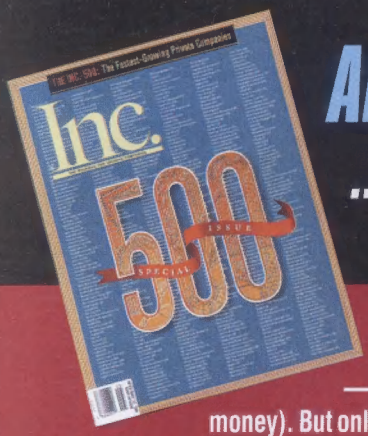

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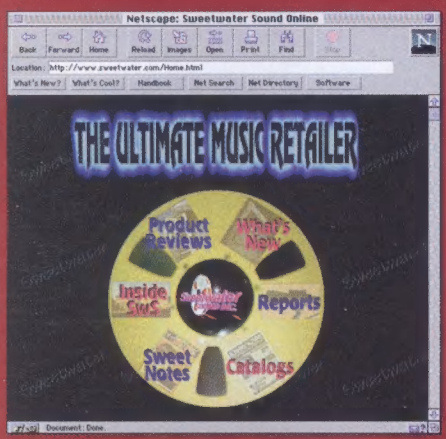

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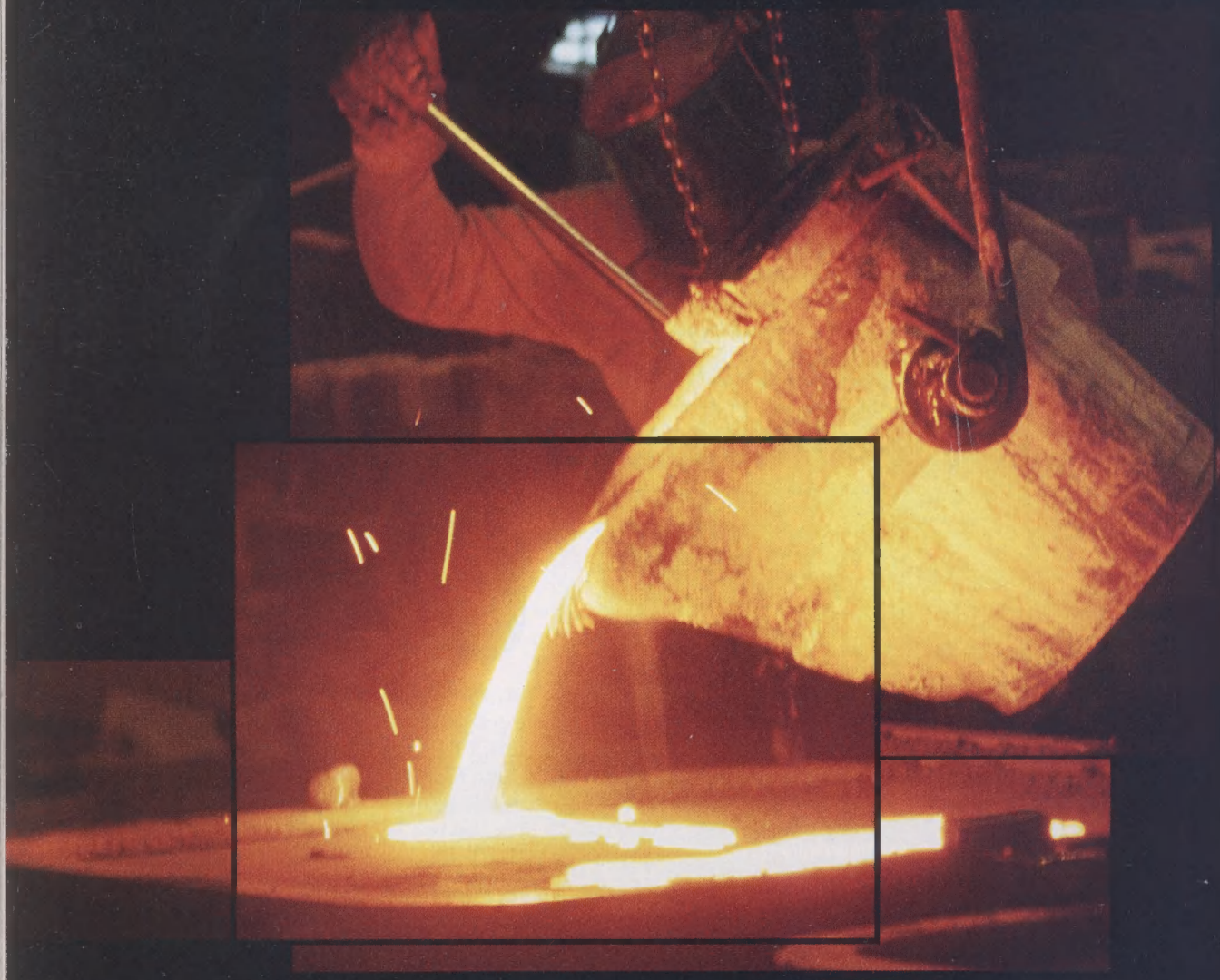

Sound Forge 4.0, the award-winning digital sound editor for Windows, now supports ActiveMovie audio plug-ins. Sonic Foundry has selected ActiveMovie (a component of Microsoft's Interactive Media technology) as the foundation for the Sound Forge plug-in architecture. ActiveMovie plug-ins will be supported by a variety of audio software companies including Sonic Foundry and Waves.

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